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AIRCRAFT NOISE DEFINITION

Individual Aircraft Technical Data

Model 707

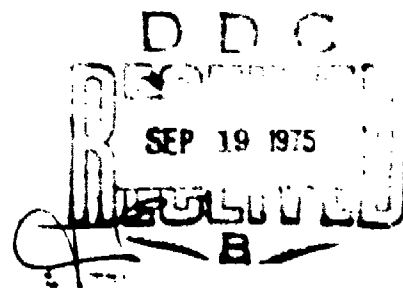
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FINAL REPORT



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1.0 INTRODUCTION

This document was written in compliance with Attachment 1,
Item 4b of Contract No. DOT-FA73 WA-3254 for the FAA.

This document contains performance and noise data in the form
of graphs for Boeing Model 707 type aircraft.

The data in this document has also been tabulated and included
in the "Boeing Airplane Noise/Performance Computer Program".

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2.0 SUMMARY

The purpose of this document is to provide the necessary information to graphically determine the takeoff, cutback, and approach performance and noise under the flight path for various Boeing model 707 type aircraft currently in operation. Data is included for the 707-120B, 720B and 707-300B Adv./C type aircraft equipped respectively with JT3D-3, JT3D-1, and JT3D-3B engines. The JT3D-3B engines are fitted with the improved cowl (IC).

The performance data shown are for operation from airports with elevations of sea level to 6000 ft., with airport temperatures from 30°F to 100°F and with reported headwinds of -10 kt to 30 kt. Climbout speeds are constant V_2+10 kt, except data are included for the 707-300B Adv./C for constant V_2+20 kt and $+30$ kt climbout speeds. Corrections to cutback thrust required charts for these increased climbout speeds are also included. Approach thrust required charts are shown for constant speeds of $1.3V_s$, $1.3V_s+10$ kt, $1.3V_s+20$ kt, and $1.3V_s+30$ kt. Takeoff data is presented for all the certified takeoff flap positions (30° for the 707-120B, 20° and 30° for the 720B and 14° for the 707-300B Adv./C). Approach data are presented for the certified approach and landing positions of 30° gear up and 30°, 40°, and 50° gear down for the 707-120B, 30° gear up and 30° and 50° gear down for the 720B and 25° gear up and 25°, 40°, and 50° gear down for the 707-300B Adv./C.

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The noise data are shown for units of effective perceived noise (EPNdB) and peak overall A weighted sound level (dBA). The range of data is from takeoff thrust to low approach thrust levels for aircraft heights from 200 ft. to 12,000 ft. Linear interpolation and extrapolation of this data is permitted between the limits of $2500 \text{ lb.} \leq F_n/6 \leq 16,000 \text{ lb.}$

Corrections are also included for airport altitudes of sea level to 6000 ft. and airport temperatures from 30°F to 100°F. Velocity corrections to EPNL are included for aircraft true airspeeds between 100 and 250 KTAS.

A brief description of the aircraft performance and noise data basis is included in Section 3.

The chart reading procedure and worked examples are shown in Section 5.

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3.0 DATA BACKGROUND

3.1 Performance Data Background

--The model 707 type performance data included in this document are derived from certified aerodynamic and propulsion parameters determined during FAA certification flight tests.

The airplane takeoff and climbout performance are representative of the 707-120B, 720B and 707-300B Adv./C, each equipped with (4) Pratt and Whitney engines as shown below.

<u>Model</u>	<u>Engine</u>	<u>S.L.S. Uninstalled Thrust ~ Lb.</u>	<u>Flat Rated T.O.</u>
707-120B	JT3D-3	18,000	59°F
720B	JT3D-1	17,000	59°F
707-300B Adv.	JT3D-3B(IC)	18,000	84°F

Installed takeoff thrust was for average engines with 2 turbocompressors operating and anti-ice bleeds off.

The "Intermediate Stage Boeing Proprietary Computer Program" operates on the certified parameters for each of the above aircraft/engine combinations to produce takeoff distance and climbout profiles including information on aircraft height, distance, speed, and thrust available. Thrust required for cutback operations at each point for each combination of airport and atmospheric variables is also defined.



Data in this document comply with F.A.R. Part 25 regulations when used in conjunction with the respective model/engine flight manuals (Ref. 1, 2, 3). The 707-120B and 720B data are for attitude warning system (AWS) off. Distance to 35 ft. data for all three aircraft are shown as constant for BRGW at and below the weight that corresponds to the minimum rotation speed (1.05 minimum control speed) for the reference conditions of sea level, 77°F.

The charts should not be entered for any airport conditions with maximum brake release gross weights nor landing weights exceeding the following:

<u>Model</u>	<u>Engine</u>	<u>Maximum BRGW ~ Lb.</u>	<u>Maximum Landing Weights ~ Lb.</u>
707-120B	JT3D-3	258,000	190,000
720B	JT3D-1	234,000	175,000
707-300B Adv./C	JT3D-3B(IC)	333,600	247,000

The minimum realistic weights to consider for these 707-type aircraft are approximately:

<u>Model</u>	<u>Engine</u>	<u>Minimum BRGW ~ Lb.</u>	<u>Minimum Landing Weights ~ Lb.</u>
707-120B	JT3D-3	160,000	140,000
720B	JT3D-1	160,000	140,000
707-300B Adv./C	JT3D-3B	190,000	160,000

In addition performance gross weight limits shown in Refs. 1, 2 and 3 must be considered when using information in this document.



The climbout profiles between 35 ft. and 400 ft. are illustrated by connecting these points with a straight line. Actual flight profiles between these two points, particularly for the increased climbout speeds of V_2+20 kt and V_2+30 kt would probably deviate from this, but the end points are correct.

The V_2+10 kt speeds shown on the all engine climbout speed charts are approximations of actual climbout speeds. For determination of actual V_2 speeds the airplane Flight Manuals (Ref. 1, 2, and 3) should be used.

3.2 Acoustic Data Background

The acoustic data contained in this document were derived from flight test measurements discussed below.

3.2.1 Model 707/720 Series Airplanes with Baseline Nacelles

On May 31, 1973, a 707-320B airplane equipped with JT3D-3B engines and production baseline nacelles, performed a series of flight tests over an array of microphones located at Madera County, California.

The tests were witnessed by FAA observers and complied with the requirements specified in Reference 4. The generalized noise data shown in pages 7.1.12 and 7.1.13 were derived from these tests.



3.2.2 Model 707/720 Series Airplanes with Quiet Nacelles

A series of acoustic tests were performed with a 707-320B airplane equipped with JT3D-3B engines and quiet nacelles on April 30, 1973. The tests were performed at Madera County, California, were witnessed by FAA observers and conducted in compliance with the requirements specified in Reference 4. The generalized noise data derived from these tests are shown in pages 7.1.14 and 7.1.15.

3.2.3 Noise Data Corrections

Noise data presented in the generalized noise curves are shown for conditions of sea level, 77°F, 70% relative humidity and 160 KTAS. To evaluate noise levels at other conditions, corrections have been developed using theoretical methods to account for the effects of:

- 1) atmospheric conditions on source noise generation
- 2) airplane velocity on duration correction, and
- 3) the effect of temperature on atmospheric absorption characteristics.

Corrections for atmospheric conditions are shown in page 6.9 and are applicable to both EPNL and dBA noise units. Corrections required to account for airplane velocity are shown in page 6.10 and are applicable only to noise levels expressed in EPNdB units.

The corrections developed to account for the effect of temperature on atmospheric absorption characteristics are complex and of doubtful accuracy due to lack of available



technology. In order to fulfill contractual obligations, corrections required to adjust noise data at 77°F to 59°F have been estimated and are presented in page 3.6. A more complete set of temperature corrections covering the range 30°F to 100°F are contained in the "Boeing Airplane Noise/Performance Computer Program."

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TABLE 3.1

TEMPERATURE CORRECTIONS
(77° F to 59° F) *

MODEL 707 BASELINE NACELLE JT3D-1/-3/-3B

ALTITUDE~FEET	$F_{n/3}$ ~THRUST~LB.	CORRECTION	
		dBA	EPNdB
400	3630	0.2	0.1
400	5880	0.1	- 0.1
400	11990	0.1	0
400	15250	0	0.4
2000	3630	0.3	0.7
2000	5880	0.8	0.7
2000	11990	0.6	0.6
2000	15250	0.6	0.5
6000	3630	2.1	2.0
6000	5880	1.4	1.5
6000	11990	1.1	1.0
6000	15250	1.0	1.0

MODEL 707 QUIET NACELLE JT3D-1/-3/-3B

ALTITUDE~FEET	$F_{n/3}$ ~THRUST~LB.	CORRECTION	
		dBA	EPNdB
400	3490	- 0.2	- 0.1
400	6130	0	- 0.1
400	11830	0.1	0
400	13930	0.1	0.1
2000	3490	0.5	0.6
2000	6130	0.5	0.6
2000	11830	0.5	0.7
2000	13930	0.4	0.5
6000	3490	1.0	0.7
6000	6130	0.9	2.1
6000	11830	0.9	2.3
6000	13930	0.7	2.2

*These corrections are non-linear functions of temperature and therefore cannot be used to determine corrections at other temperatures.

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4.0 REFERENCE LISTINGS

4.1 List of Figures

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	Atmospheric Effects Correction on Noise	6.9
	Velocity Correction on Noise	6.10
7.0	Performance Charts for Model 707 Type Aircraft	7.1 7.X.X
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Generalized Noise Data,
EPNdB, Quiet Nacelle

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Generalized Noise Data, dBA,
Quiet Nacelle

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4.2 References

1. D6-1586, FAA Approved Airplane Flight Manual, Boeing Model 707-100B Series (P&W JT3D-3 Engines), The Boeing Company, Renton, Washington, March 23, 1962.
2. D6-1578, FAA Approved Airplane Flight Manual, Boeing Model 720B Series, The Boeing Company, Renton, Washington, March 3, 1961.
3. D6-1587, FAA Approved Airplane Flight Manual, Boeing Model 707-300C Series, The Boeing Company, Renton, Washington, September 20, 1963, revised February 21, 1968.
4. Federal Aviation Regulations; Part 36 - Noise Standards: Aircraft Type Certification.

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5.0 CHART READING PROCEDURE

The following section illustrates the proper use of the charts of Sections 6 and 7 to find the noise level contribution at a particular noise sensitive point under the approach or departure path of the aircraft.

The height of the aircraft following takeoff and climbout at any distance from brake release is found from the combination of distance to 35 ft. and climbout charts in Section 7. However, the BRGW used to enter these charts should be determined to be below the gross weight limits shown in Section 3.1 and also below the performance limits shown in the Flight Manuals (Ref. 1, 2, and 3) for those airport conditions.

Climbout speed is determined from the chart in Section 7.0 and, with the height determined above, is converted to true airspeed using the first chart in Section 6. Net takeoff thrust can be determined using the chart in Section 7 and corrected using page 6.3.

The aircraft height, corrected net thrust and true airspeed calculated above constitute the aerodynamic performance necessary to determine the noise. The appropriate generalized noise chart in Section 7 is entered with these parameters to determine the noise at reference conditions. This noise level is then corrected to the actual conditions using the charts in Section 6.



If a thrust cutback procedure was initiated for noise abatement purposes the height is adjusted using page 6.5. The cutback should be initiated .3 nautical miles (1823 feet) prior to the start of the noise sensitive region to allow for engine spindown. Thrust may be reduced based on flying a constant gradient, rate of climb, or EPR. For constant gradient the thrust may be determined using the appropriate chart in Section 7. If a constant rate of climb cutback is selected, it is converted to gradient using page 6.5. If a constant EPR cutback is selected, its corresponding corrected net thrust is first determined using the chart in Section 7 and then converted to gradient, using the cutback thrust charts in Section 7.

Noise at any point under the approach path is found by first determining the height from page 6.6. The speed for the given flap and gross weight and the thrust required is obtained from Section 7. The speed and thrust required are then converted to true airspeed and corrected net thrust using pages 6.2 and 6.3.

All airplane performance can be corrected for winds. However, the noise data of Section 7 were measured in calm air, and no corrections to this data for wind

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are included. For takeoff and climbout, wind corrections are shown on the charts in Section 7. For cutback, an additional wind correction to the height attained during cutback is made by use of page 6.7. For approach, wind affects the thrust required and can be accounted for using page 6.8 prior to determining the thrust required.

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5.1 CHART READING EXAMPLE FOR TAKEOFF NOISE

707-300B Adv./C JT3D-3B Baseline Engines

Step	PROCEDURE	SELECTED CONDITIONS	CALCULATED RESULTS
1.	For the given model, engine, flap, BRGW and the following airport conditions: Temperature Altitude Headwind Find on pg. 7.3.8 the equivalent BRGW and the all engine distance to a height of 35 ft.	14° 280,000 lb. 80°F 2000 ft. +15 kt	284,500 lb. 6750 ft.
2.	Then for the above conditions, and the selected climbout speed, find the equivalent profile gross weight, from pg. 7.3.10. Using the same page, find the height at a selected distance from brake release $3.5 \times 6076 = 21,266$ ft. From 35 ft.: $21,266 - 6750 = 14,516$ ft. The height at this equivalent profile weight and distance from 35 ft. height is	$V_2 + 20$ kt 3.5 n.mi.	288,200 lb. 1450 ft.
3.	For the selected BRGW, flap, climbout speed increment and airport conditions find on pg. 7.3.1 the all engine climbout speed.		175.2 KEAS
4.	Convert this equivalent airspeed to true airspeed with pg. 6.2 by entering with airport temperature and airplane altitude of $2000 + 1450 = 3450$ ft.		189.5 KTAS
5.	On pg. 7.3.12 find the net takeoff thrust per engine of		12,990 lb.
6.	Convert to corrected net thrust ($F_N/6$) using pg. 6.3.		14,750 lb.
7.	Find the noise under the flight path at reference conditions for a height of 1450 ft. and a corrected net thrust ($F_N/6$) of 14,750 lb. EPNdB level is obtained from pg. 7.1.12 and dBA level is obtained from pg. 7.1.13.		Reference: 110.4 EPNdB 94.9 dBA

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<u>Step</u>	<u>PROCEDURE</u>	<u>SELECTED CONDITIONS</u>	<u>CALCULATED CALCULATED</u>
8.	Find the corrections for actual conditions of 2000 ft. airport altitude and 80°F airport temperature from pg. 6.9. For EPNdB an additional correction is needed for a true airspeed of 189.5 KTAS. This correction is found on pg. 6.10. These corrections are added to the reference values to give actual flight path noise.		Corrections: -.3▲ EPNdB -.3▲ dBA -.7▲ EPNdB Total: 109.4 EPNdB 94.6 dBA

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5.2 CHART READING EXAMPLE FOR CUTBACK NOISE

707-300B Adv./C JT3D-3B Baseline Engines

Step	PROCEDURE	SELECTED CONDITIONS	CALCULATED RESULTS
1.	Steps 1 through 4 of the takeoff analysis are unchanged except step 2 is modified in step 5 below.		
2.	For cutback to a constant rate of climb, use pg. 6.4 to find the cutback gradient for a true airspeed of 189.5 KTAS.	800 fpm	4.16%
3.	With the BSW, gradient, flap, and climbout speed use pg. 7.3.2 to find the net thrust required.		8790 lb.
4.	With the true airspeed, the headwind and the cutback gradient, use pg. 6.7 to find the wind corrected cutback gradient.		4.52%
5.	Find the height above the runway at the cutback initiation point .3n.mi. prior to the noise measuring point. Enter pg. 7.3.10 with the equivalent profile gross weight of 288,200 lb. and at a distance of $14,516 - (.3) \times 6076 = 12693$ ft. from the 35 ft. height.		1250 ft.
6.	Find the incremental height gained during cutback by entering pg. 6.5 with the corrected gradient and the distance of 1823 ft. Add this to the height at cutback initiation to find the height at the noise sensitive point.		82 ft. 1332 ft.
7.	Convert the net thrust to corrected net thrust using pg. 6.3.		9930 lb.
8.	The engine pressure ratio (EPR) may be found on pg. 7.3.13 for the conditions of corrected net thrust, altitude, and equivalent airspeed.		1.488
9.	Find the noise under the flight path at Reference conditions for a height of 1332 ft. and at corrected net thrust of 9930 lb. EPNdB level is found on pg. 7.1.12 and dBA level is found on pg. 7.1.13.		Reference: 109.1 EPNdB 93.2 dBA

<u>Step</u>	<u>PROCEDURE</u>	<u>SELECTED CONDITIONS</u>	<u>CALCULATED RESULTS</u>
10.	Correct to the actual conditions as in step 8 of the takeoff case.		Totals: 108.1 EPNdB 92.9 dBA

21 6 30 1140 ORIG BY 71

REV SYM

BOEING

NO. D6-42141-1

PAGE



5.3 CHART READING EXAMPLE FOR APPROACH NOISE

707-300B Adv./C JT3D-3B Baseline Engines

Step	PROCEDURE	SELECTED CONDITIONS	CALCULATED RESULTS
1.	Select a landing flap, gross weight and speed increment above the reference landing speed. Use pg. 7.3.3 to find the approach speed.	40° 200,000 lb. 20 kt.	144.7 KEAS
2.	At the desired distance from the threshold and the selected glide slope angle, find the aircraft height. $2 \times 6076 = 12,152$ ft. Enter pg. 6.6 to determine the height.	2.0 n.mi. 3.0°	683 ft.
3.	Assuming the same airport conditions as for takeoff, determine true airspeed from pg. 6.2.	2000 ft. 80°F	154.9 KTAS
4.	For the airport headwind, true airspeed, and intended glide slope, use pg. 6.8 to find the wind corrected glide slope	+15 kt.	2.72°
5.	Using the wind corrected glide slope and the true airspeed find the rate of descent on pg. 6.4.		740 fpm
6.	Use the gross weight, flap setting, and wind corrected glide slope to find the net thrust on pg. 7.3.6.		4630 lb.
7.	Convert to corrected net thrust using pg. 6.3.		5110 lb.
8.	Find the noise under the flight path at reference conditions for a height of 683 ft. and a corrected net thrust of 5070 lb. EPNdB level is obtained from pg. 7.1.12 and dBA level is obtained from pg. 7.1.13.		References: 110.5 EPNdB 99.3 dBA
9.	Correct to actual conditions as in step 8 of the takeoff case except the EPNdB velocity correction of pg. 6.10 is now based on 154.9 KTAS.		Corrections: -.3 Δ EPNdB -.3 Δ dBA +.1 Δ EPNdB Totals: 110.3 EPNdB 99.0 dBA



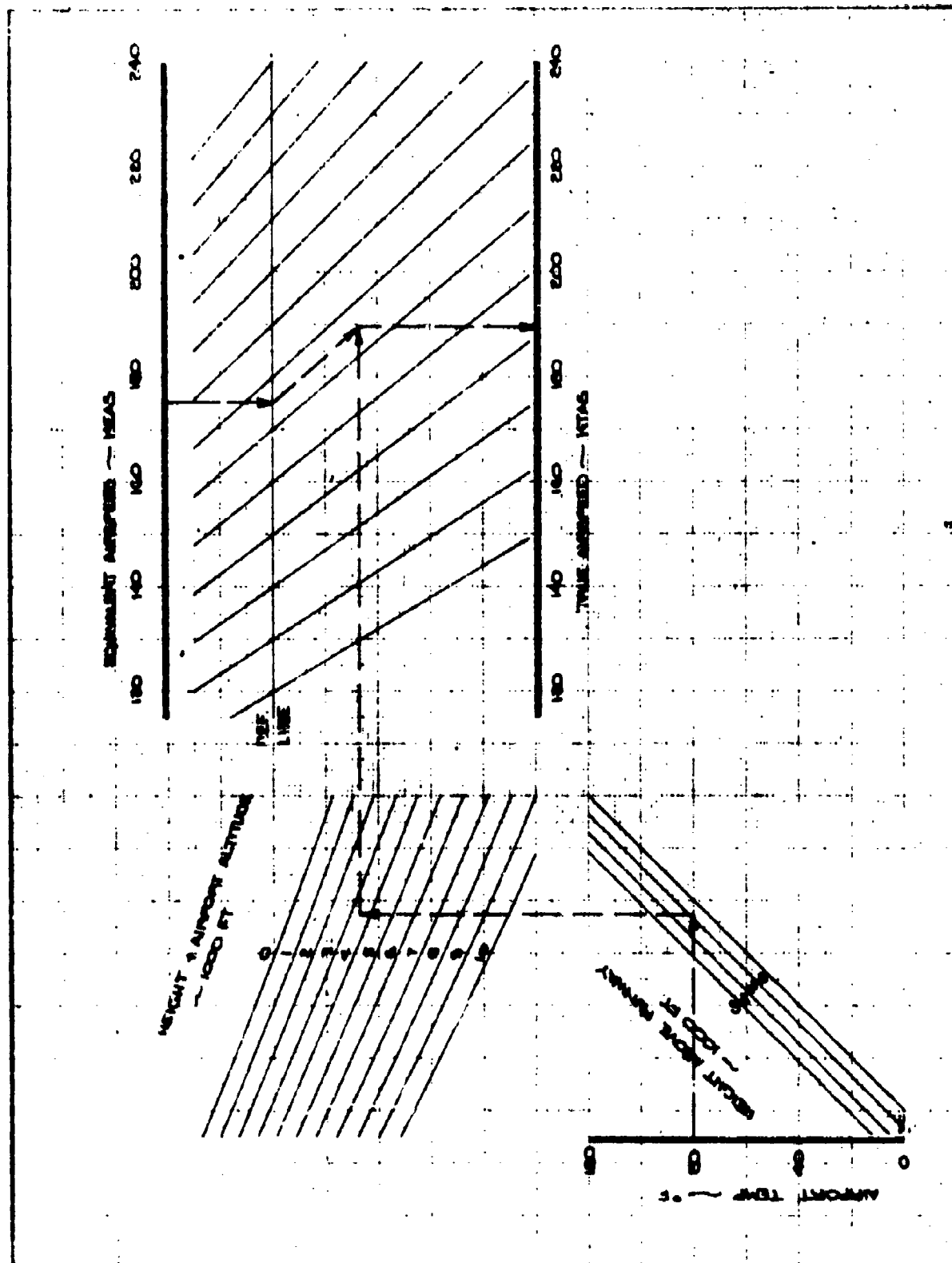
J18-089

6.0

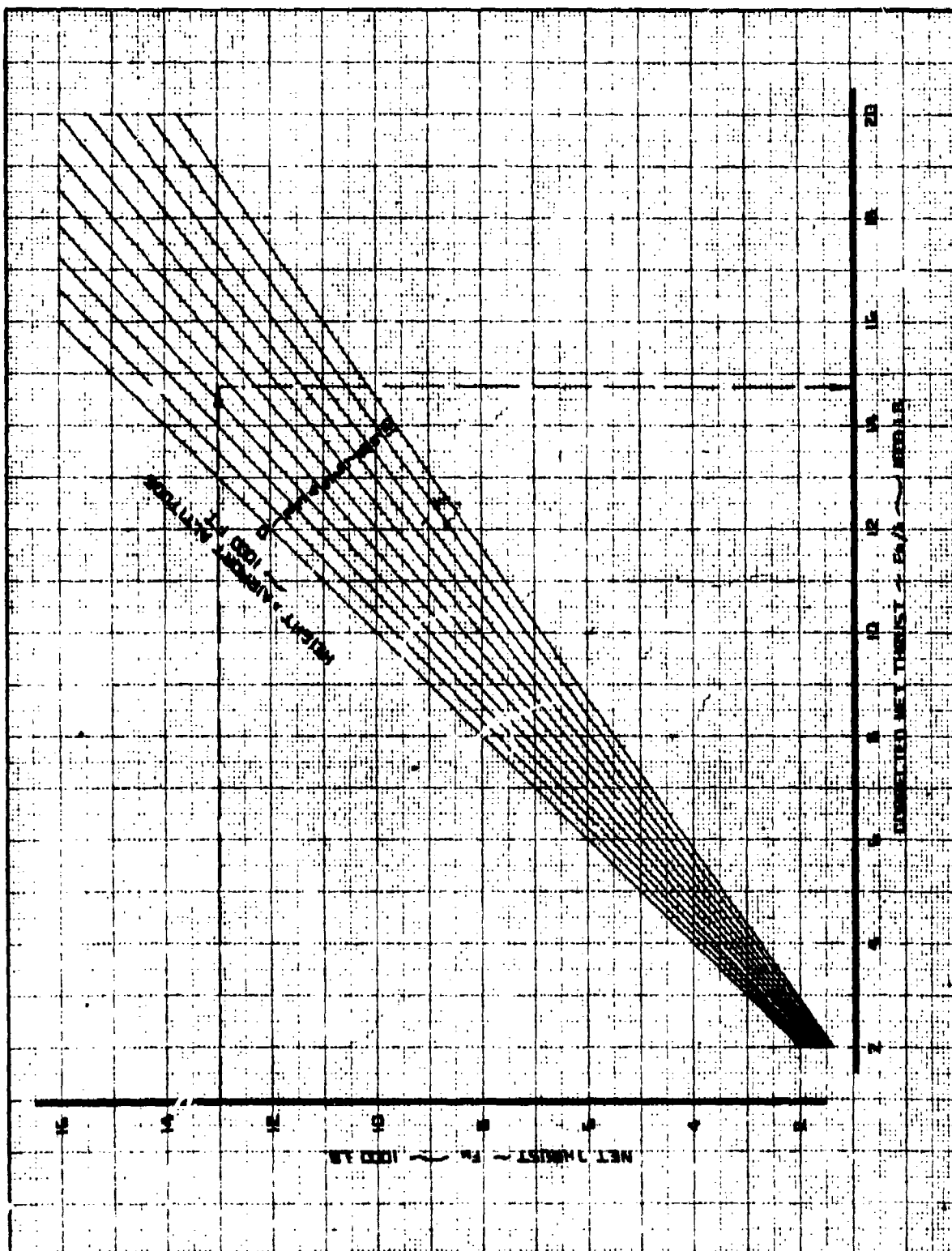
PERFORMANCE CHARTS COMMON TO ALL AIRCRAFT

DI 6108 21 60 Q116.2/71

REV SYM



NAME	LEE	DATE	5-22-72	CONVERSION CHART EQUIVALENT TO TRUE AIRSPEED THE BOEING COMPANY	707
CREW	ANDERSON	DATE	5-28-72		06-42141-1
ACFT	B-6 WILLIAMS	DATE	10-5-72		PAGE
NOTE					6.2



CALC	LEE	10-26-72	REVISED	DATE
CHECK	B.G. Williams	10-26-72		
APR				
APR				

CONVERSION CHART
NET THRUST TO CORRECTED NET THRUST

THE BOEING COMPANY

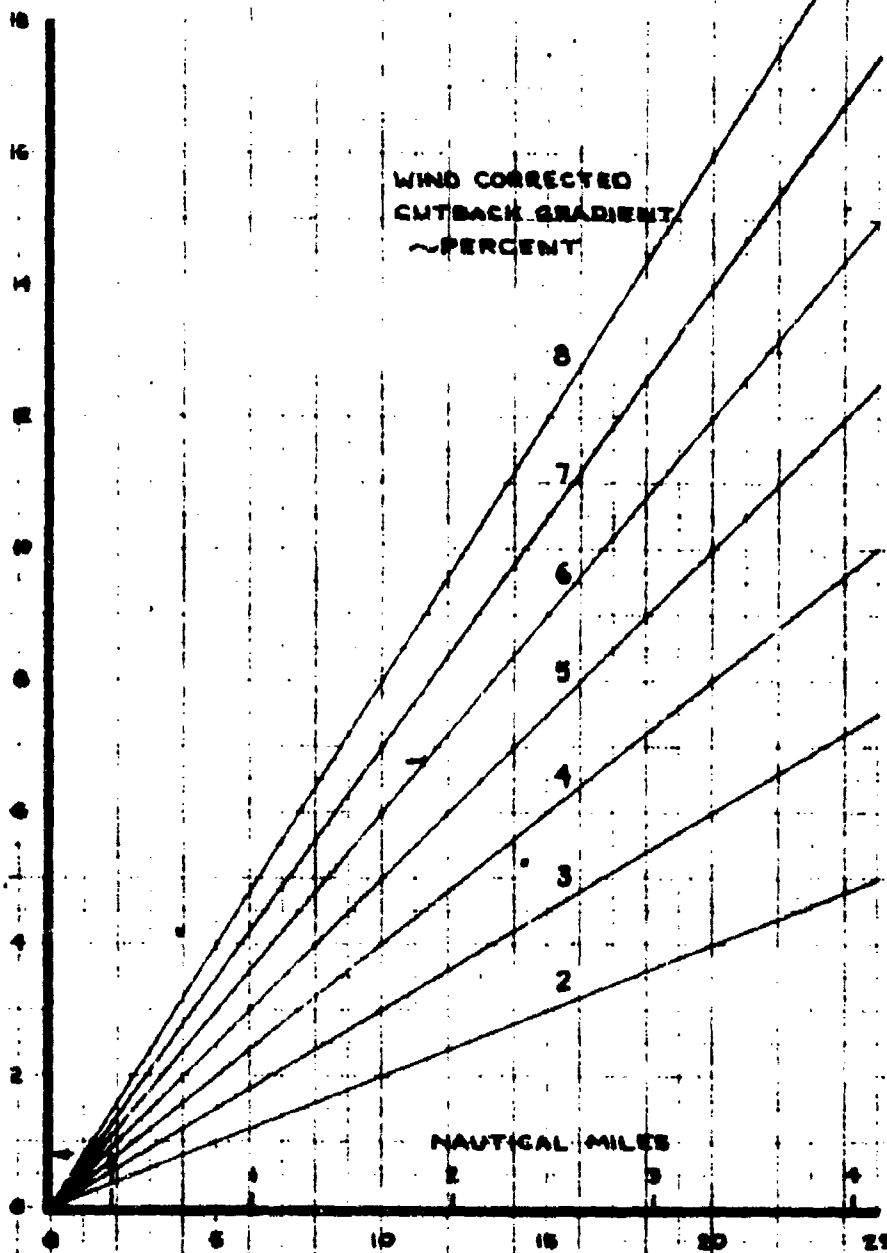
707

D6-42141-1

PAGE

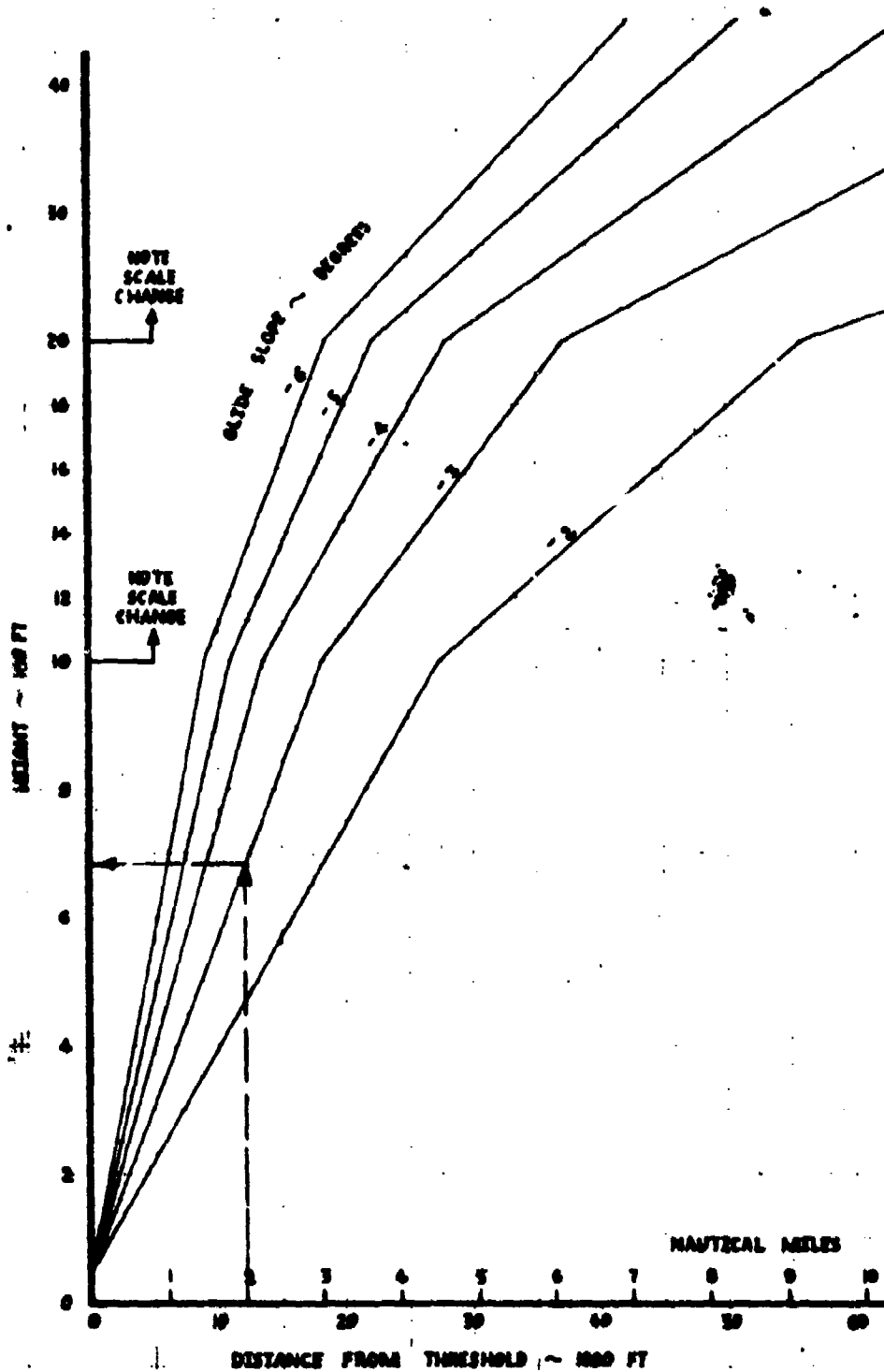
6.3

HEIGHT INCREMENT ABOVE CUTBACK POINT ~ 100 FT

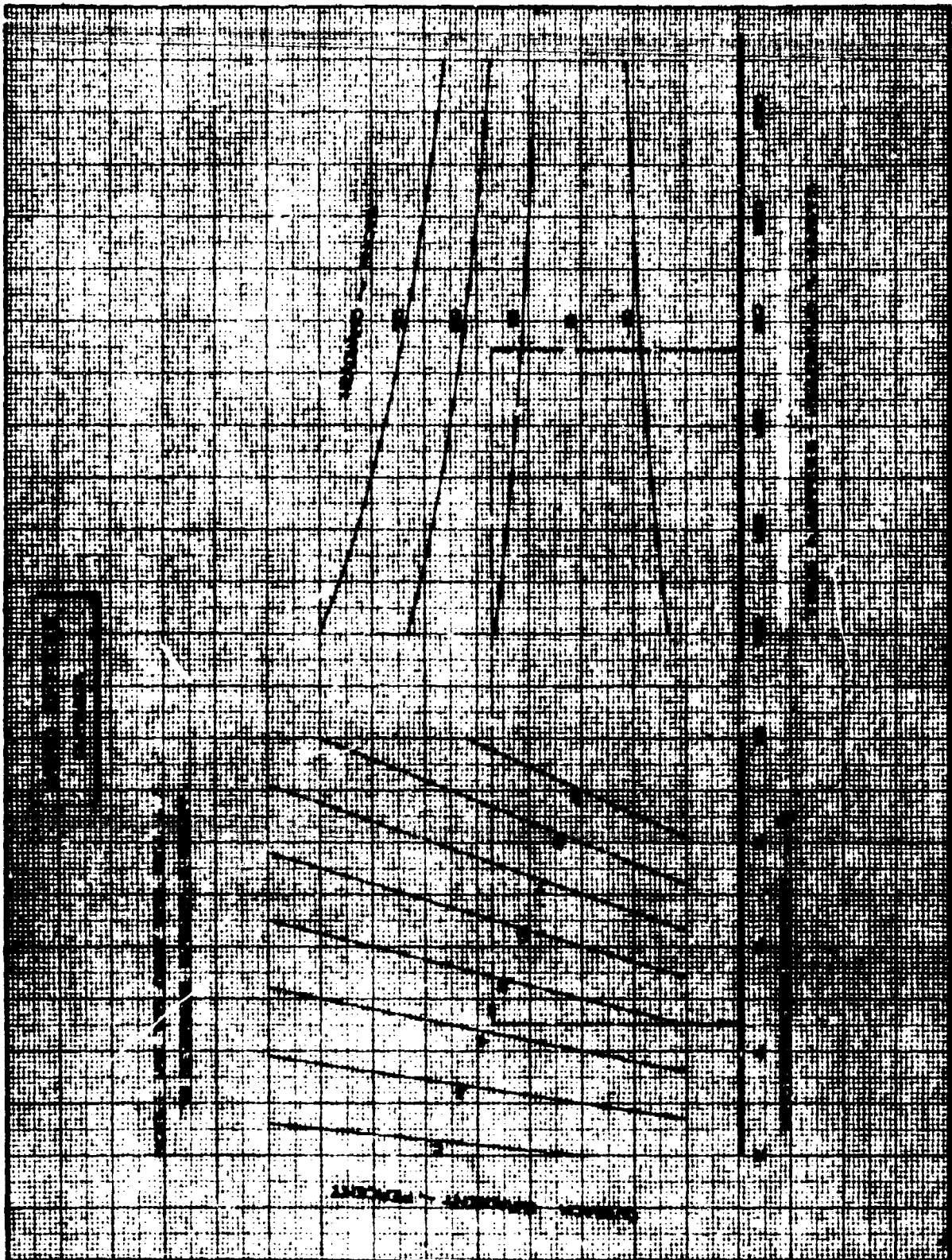


CALC	B. G. WILKINS	7-17-75	REVISED	DATE	CUTBACK HEIGHT	707
CHECK	SCHROETER	7-18-75				DC-42M1-1
APP					THE BOEING COMPANY	PAGE
APP						6.5
INK	SCHROETER	7-20-75				

APPROACH HEIGHT



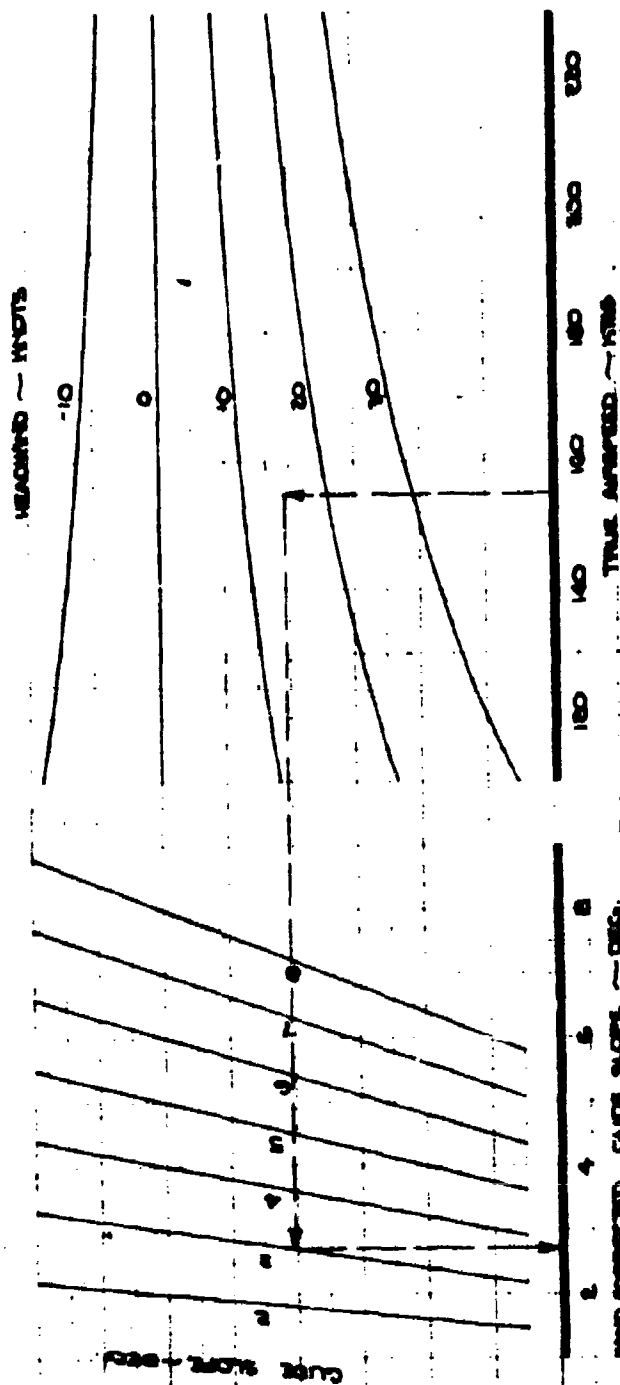
CALC	SERENI	8/22/72	REVISED	DATE	APPROACH HEIGHT	707
CHECK	B.G. Williams					06-42M1-1
APP					THE BOEING COMPANY	PAGE
APP						6.6
PLT	W. G. BROWN	8/22/72				



CALC	LEE	52572	REVISED	DATE	WIND EFFECT	707
CHECK	ANDERSON	52572	SERENI	11/11/73		
APR					CUTBACK	06-42141-1
APR						
INA	FELTES				THE BOEING COMPANY	PAGE 67

WIND EFFECT APPROACH

NOTE: USE THIS CHART WITH EGSE 7.1.4, 5.6, 7.1.2.6, 7.1.8, 9.1.3.4, 8.1.6, and 7 TO DETERMINE APPROACH THRUST

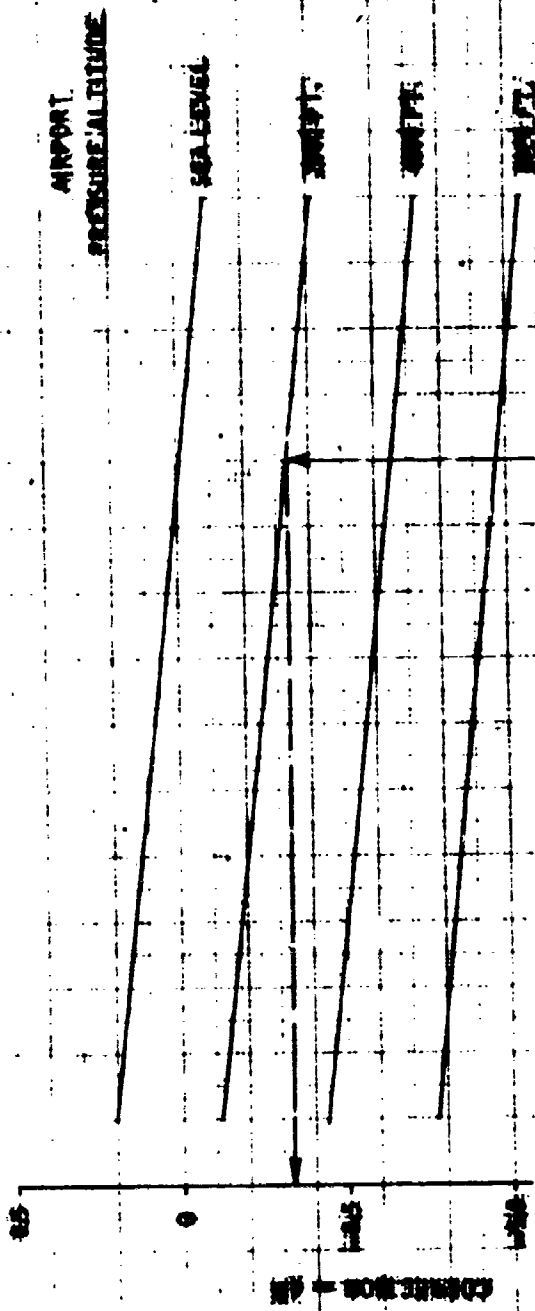


CALC	FELTES	DATE	REVISED	DATE	WIND EFFECT APPROACH	707
CHECK	ANDERSON	DATE				06-42141-1
APP					THE BOEING COMPANY	PAGE
APP						6.8

REPORT OF THE AIRCRAFT ENGINEER

DATE

TIME



CALC	R. Yates	9/10/72	REVISED	DATE
CHECK				
APR				
APR				

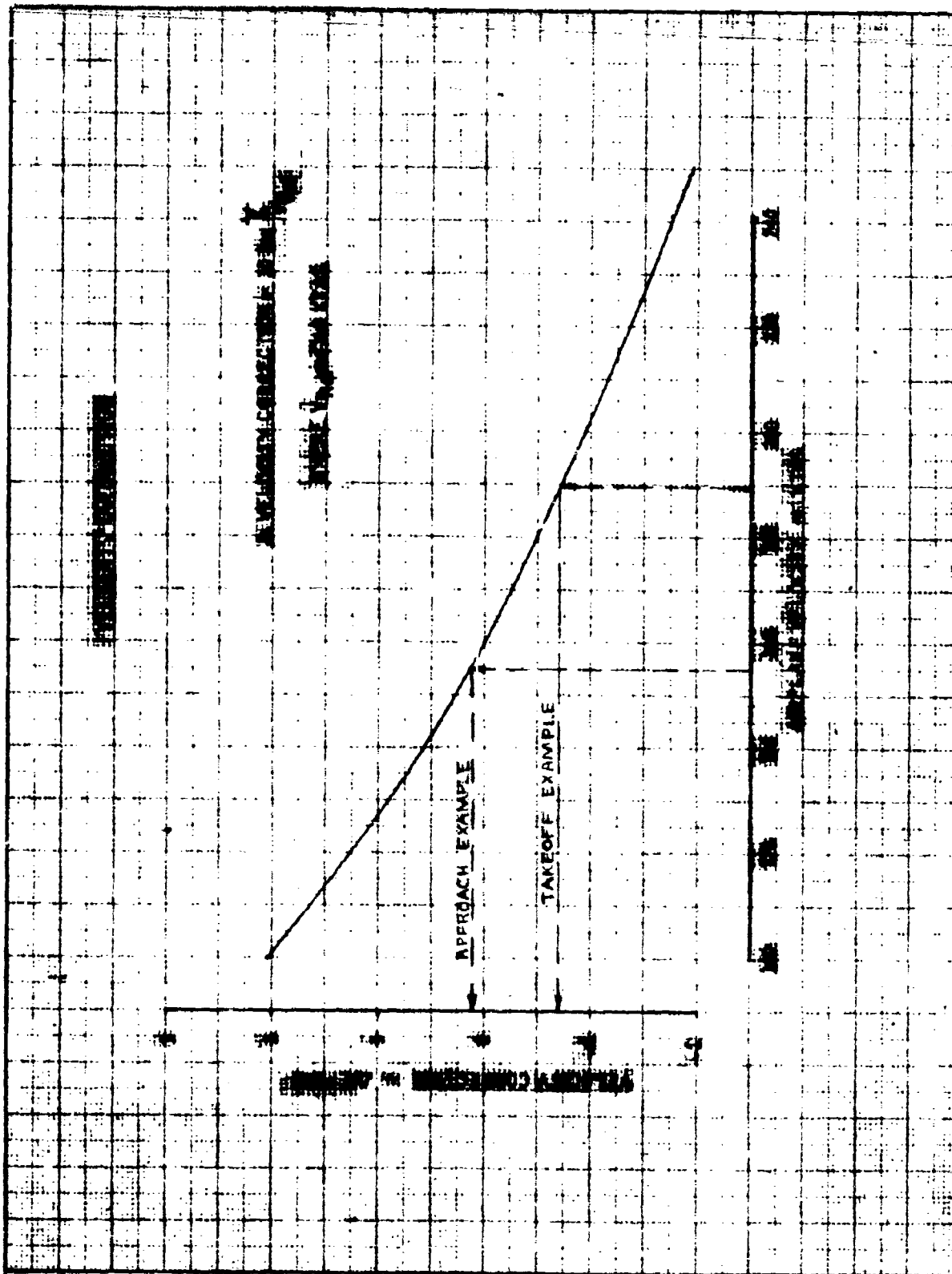
AIRPORT ALTITUDE AND
TEMPERATURE CORRECTIONS
TO EPN68 AND 48A

THE BOEING COMPANY

707

DG-92141-1

PAGE
6.9



CALC	R. J. J.	2/1/73	REVISED	DATE	VELOCITY CORRECTIONS TO EPNJB	707
CHECK						DC-4241-1
APR						PAGE
APR						6.10
THE BOEING COMPANY						

7.0 PERFORMANCE AND NOISE CHARTS FOR 707 TYPE MODELS

7.1 707-120B Aircraft with JT3D-3 Engines

DT 8100 2740 QRIQ 8/21

REV SYM

BOEING

NO D6-42141-1

PAGE 7.1



ALL ENGINE CLIMBOUT SPEED
V₂ +10 KTS

FLAPS 30°

ENGINE CLIMBOUT SPEED
V₂ +10 KTS

AIRPORT
PRESSURE
ALTITUDE
-1000 FT

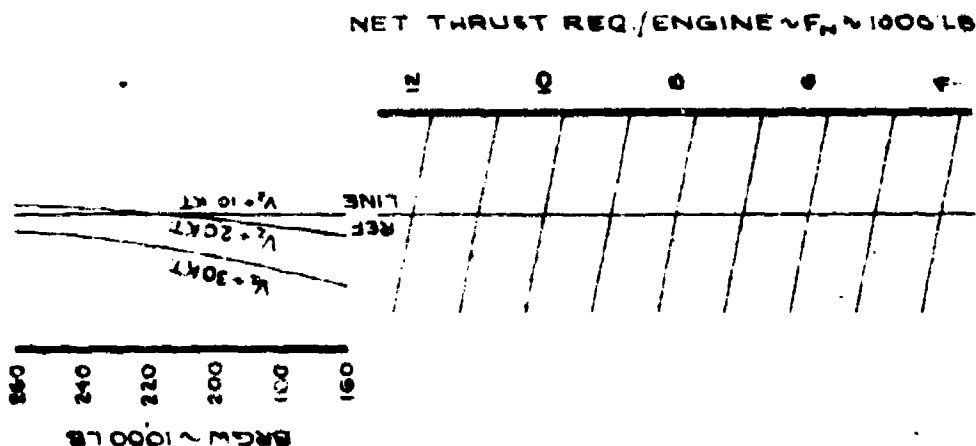
AIRPORT TEMPERATURE

CLIMBOUT SPEED

CLIMBOUT SPEED

CALC	R.E. BULLOCK	9-8-73	REVISED	DATE	ALL ENGINE CLIMBOUT SPEED FLAPS 30° JT3D-3 ENGINES	707-120B
CHECK	LARSON	7-26-73				06-42M-1
APP						
APP						
INH	W.C. BROOKS	9/10/73			THE BOEING COMPANY	PAGE 7-1-1

[SPEED CORRECTION]

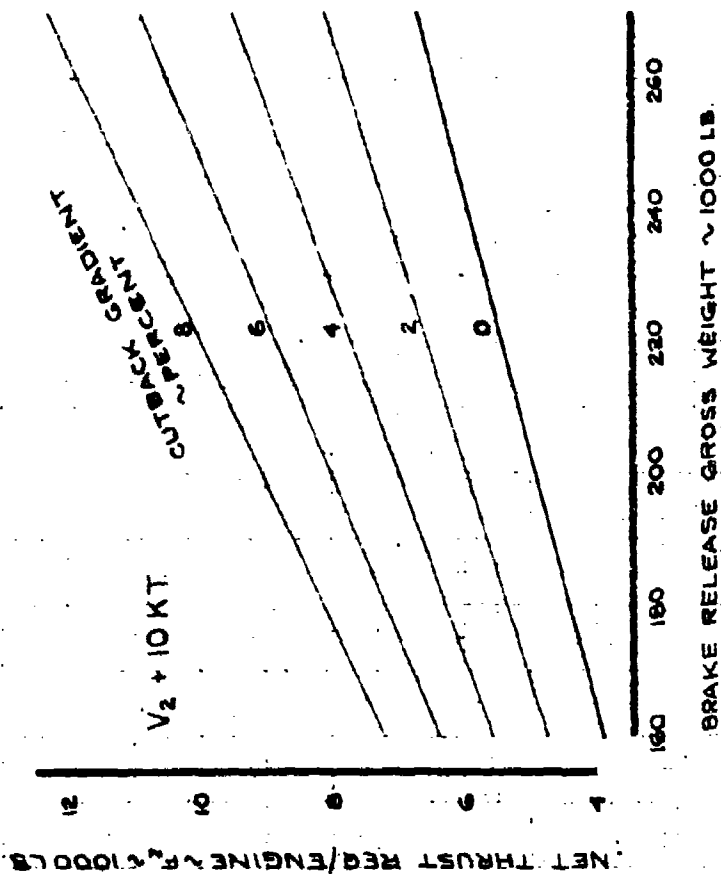


[CUTBACK THRUST REQUIRED]

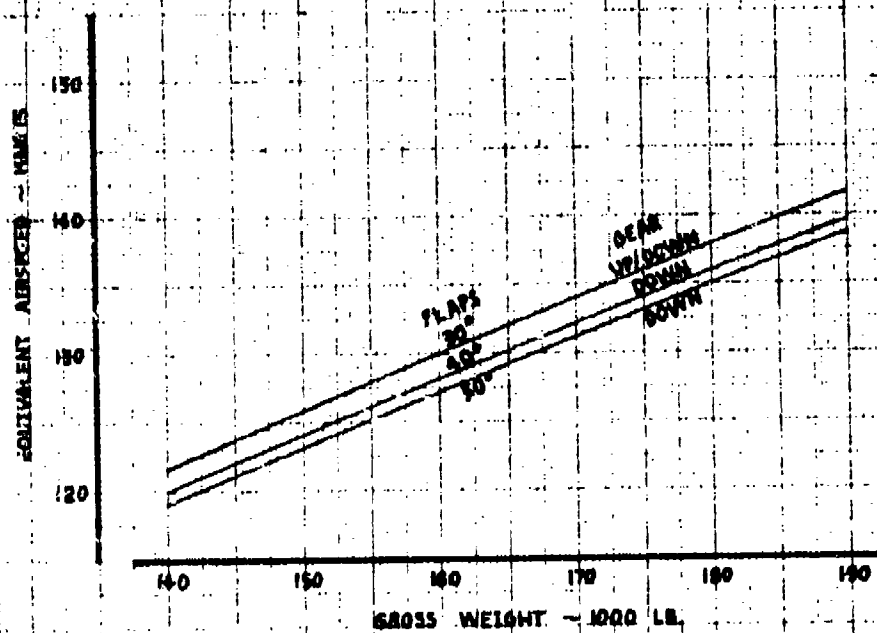
FLAPS 30°

NOTES:

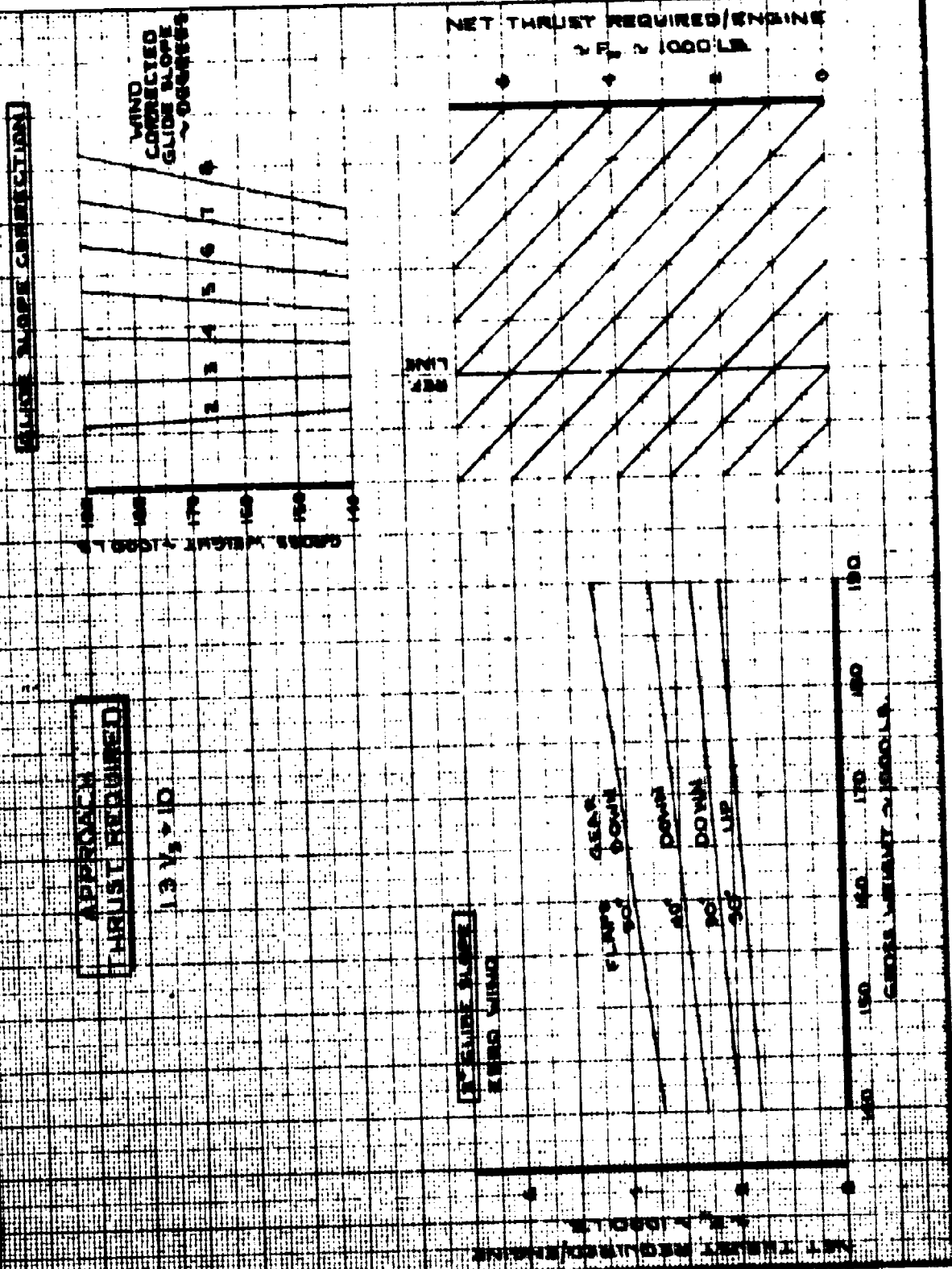
- 1 ALL ENGINES OPERATING
- 2 SEA LEVEL 11°F BUT ACCURATE FOR ANY ALTITUDE AND TEMPERATURE TO WITHIN ± 50 LB. OF THRUST/ENGINE
- 3 FAR PART 35 MINIMUM THRUST REQUIRED IS THAT FOR A 4% GRADIENT



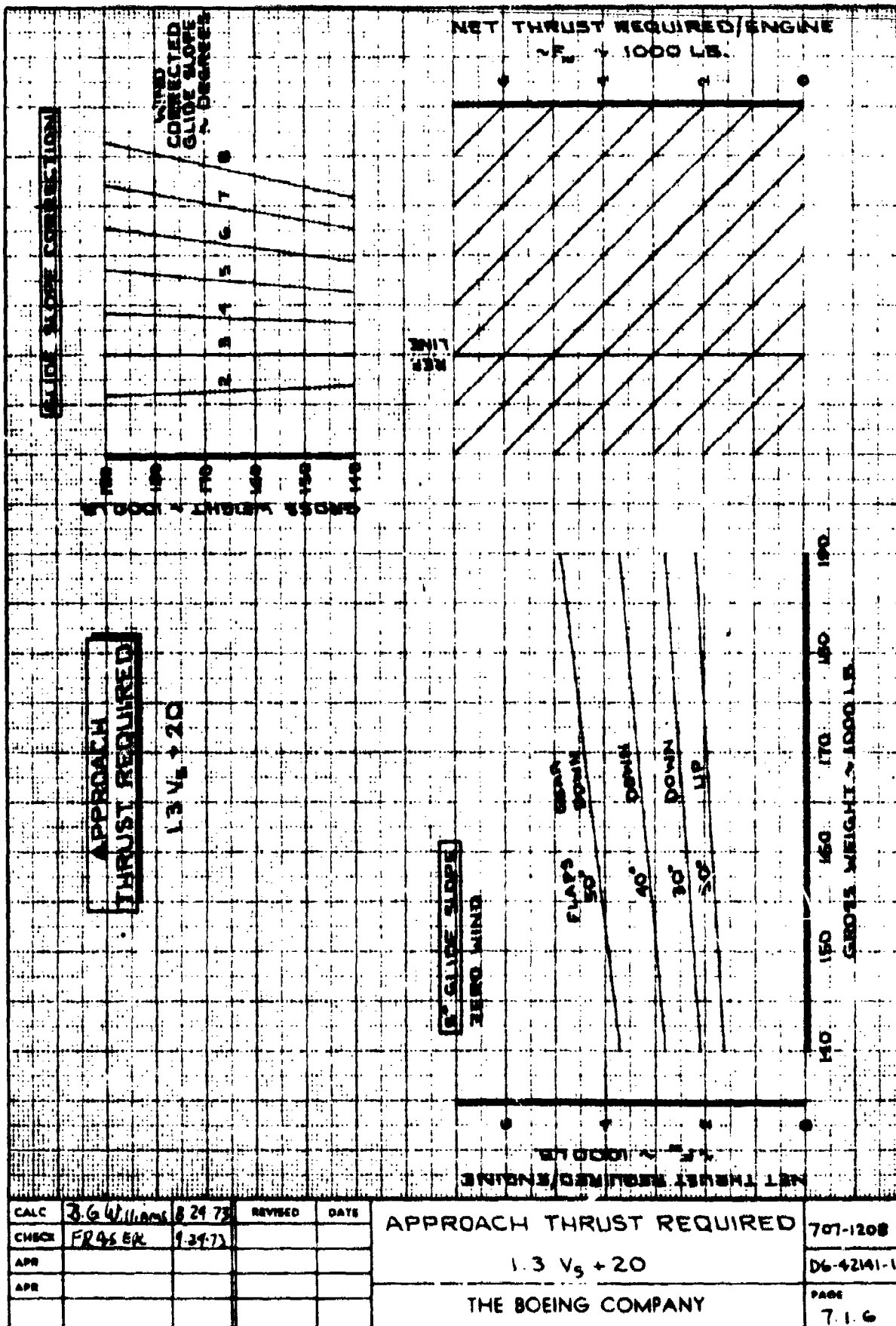
CALC	R. E. SCHROETER 8-23-73	REVISED	DATE	CUTBACK THRUST REQUIRED	TOT-120B
CHECK	LARSON 9-26-73	R. E. B.	11-19-73	V ₂ + 10 KT	FLAPS 30°
APR					06-4241-1
APR					PAGE 7.1.2
PLOT	SCHROETER 8-24-73			THE BOEING COMPANY	

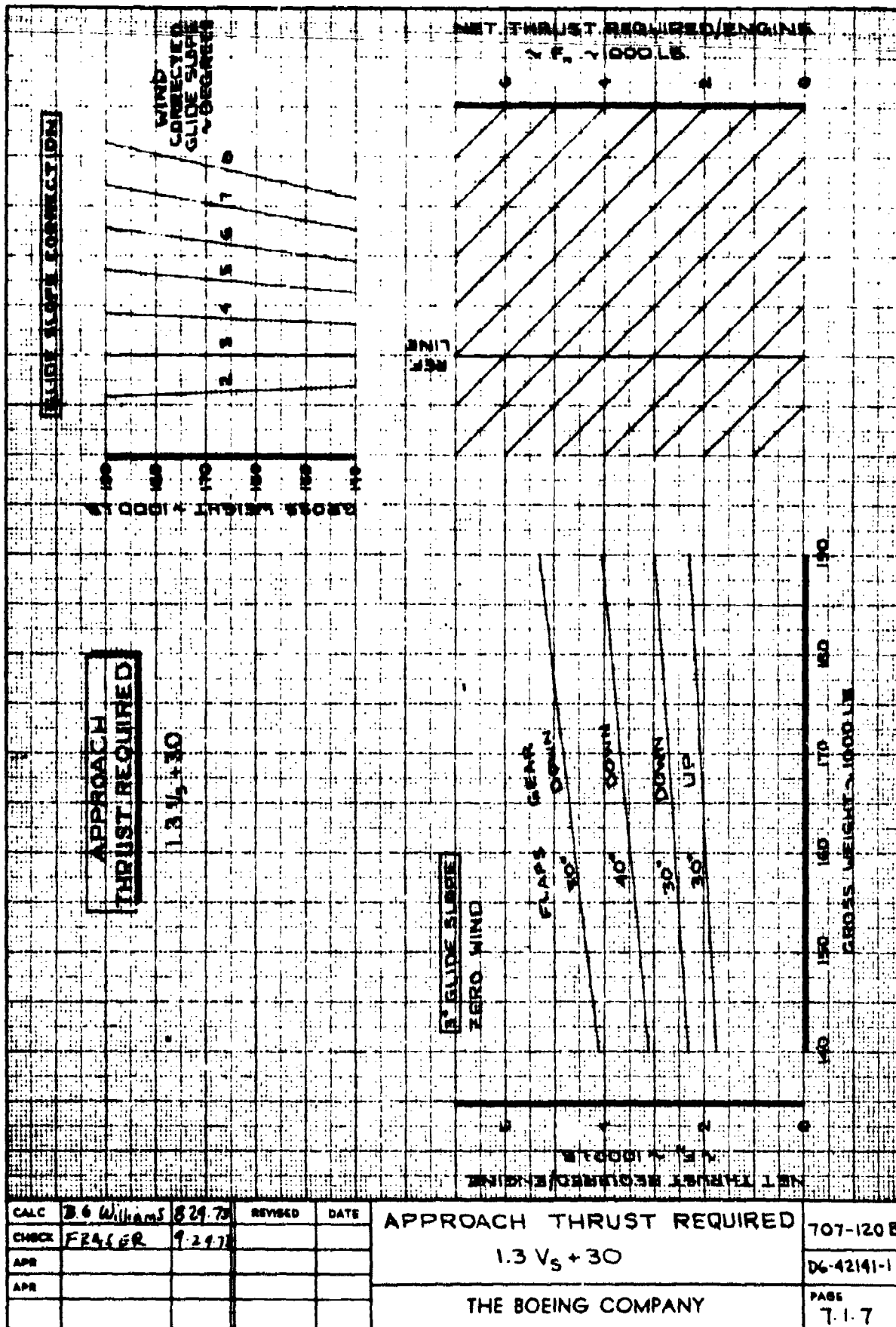


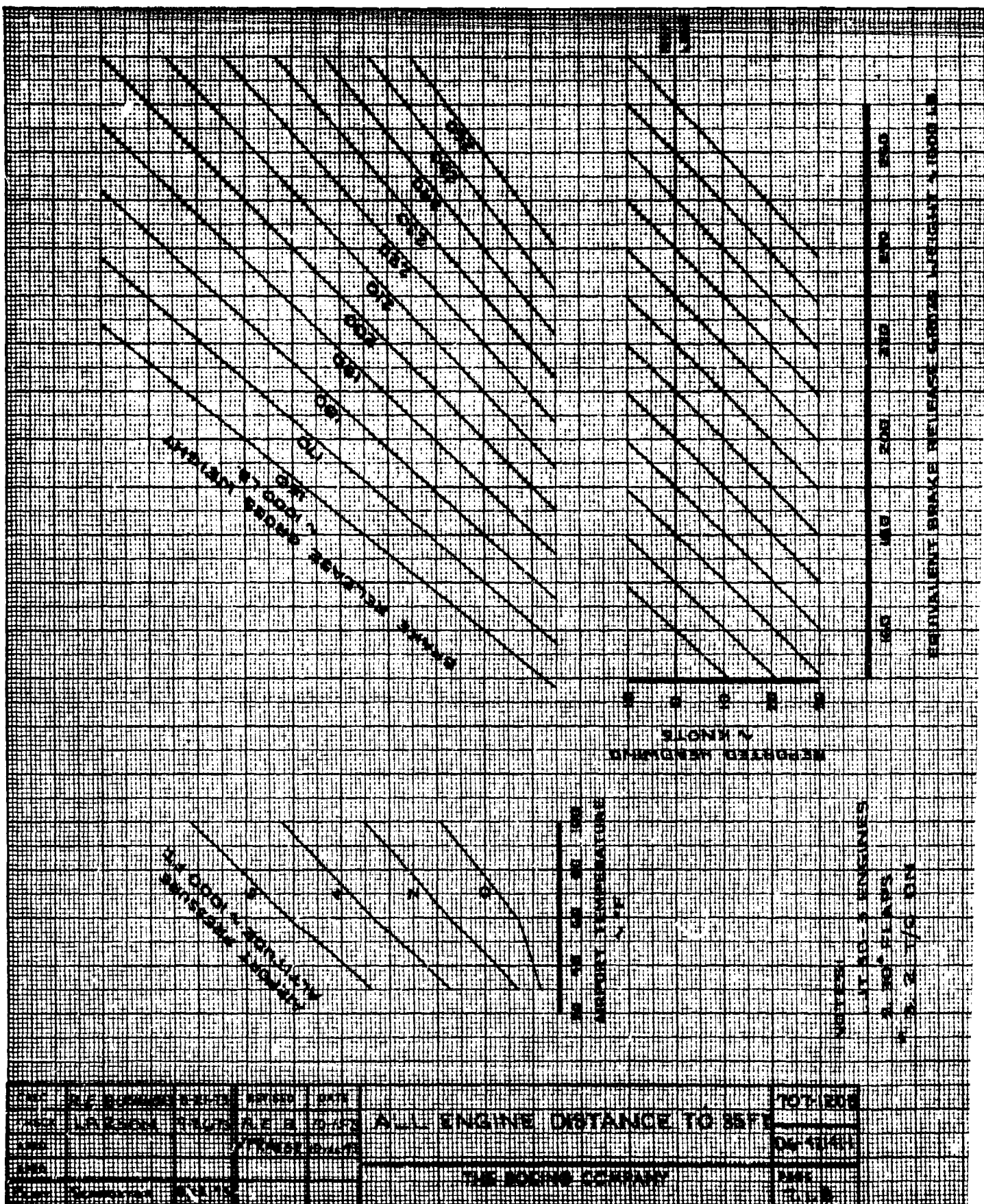
CALC	R.E. Bushholz	9-10-73	REVISED	DATE	APPROACH SPEED 1.3 V _S	707-1208
CHECK	LARSON	9-25-73				D6-42141-1
APR					THE BOEING COMPANY	PAGE
APR						7.1.3
ENR	W.G. BROOKS	9/11/73				



CALC	B.G. Williams	8-29-75	REVISED	DATE	APPROACH THRUST REQUIRED	707-1208
CHECK	FRASEK	9-29-75			13 V _S + 10	D6-42141-1
APR						PAGE
APR					THE BOEING COMPANY	7.1.5







1000
1000

SECTION

1. 20 1 ENGINES

2. 20 FLAPS

3. 2 1/2 ON

100 200 300 400 500

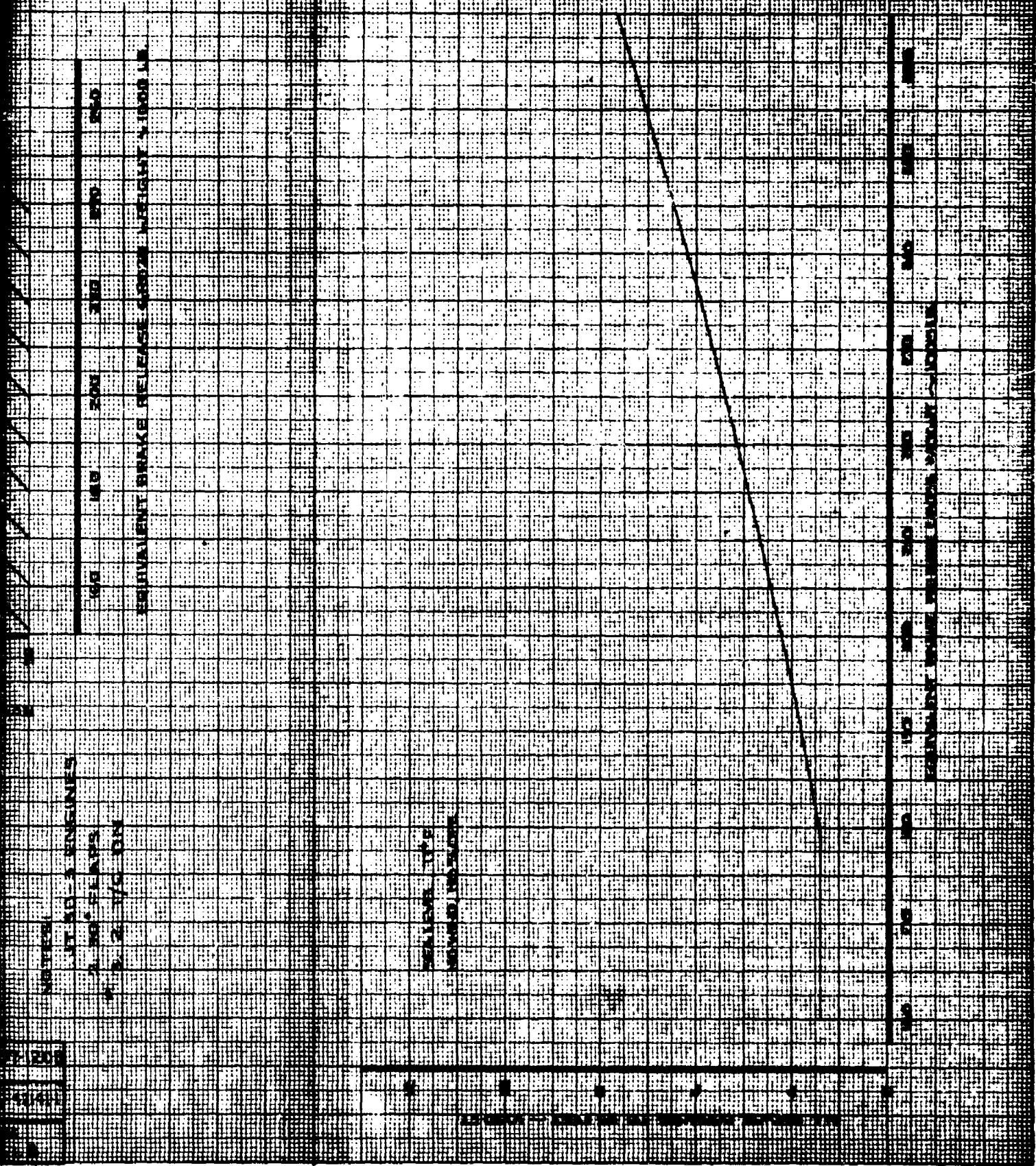
EQUIVALENT BRAKE RELEASE CIRCUMFERENCE WEIGHT 1000 LB

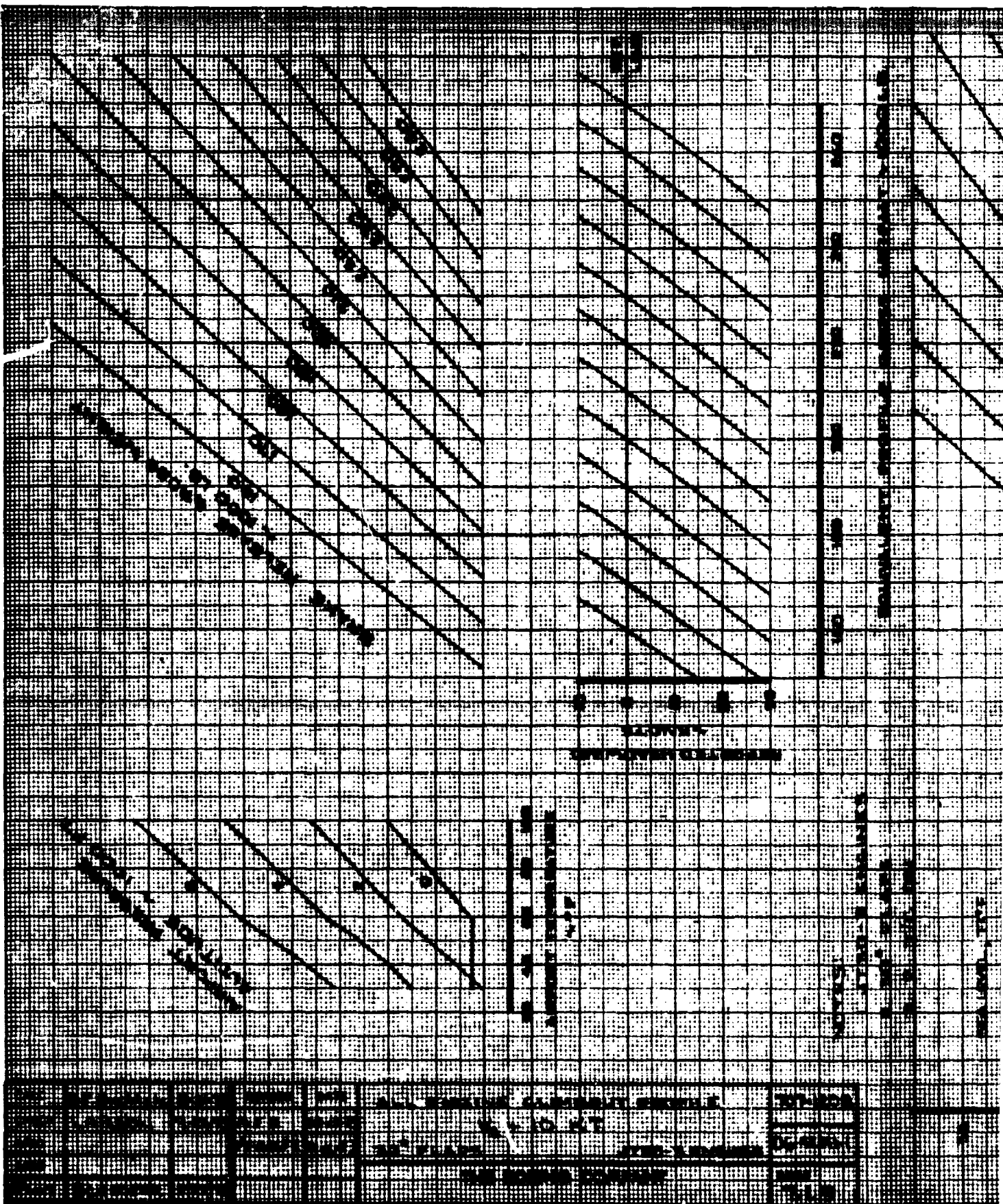
SECTION 100

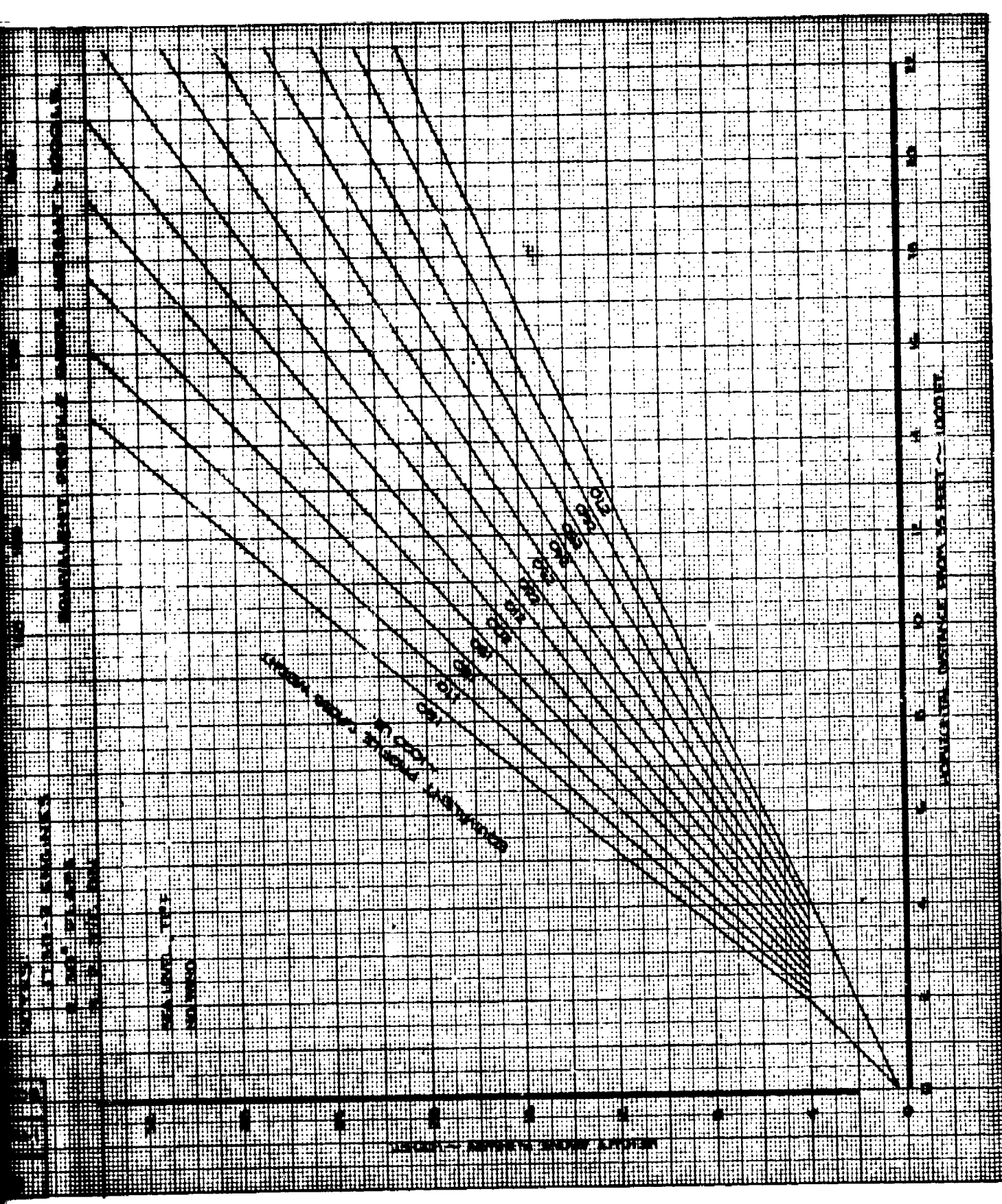
SECTION 100

100 200 300 400 500

EQUIVALENT BRAKE RELEASE CIRCUMFERENCE WEIGHT 1000 LB



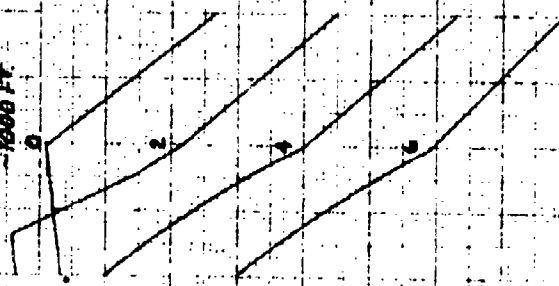




GENERALIZED TAKEOFF THRUST

JT3D-3 AVG. ENGINES
2.7% ON

AIRPORT ALTITUDE
~1000 FT.



TRUE AIRSPEED
~KTAS

200
150
100

REF
LINE

HEIGHT
ABOVE
RUNWAY
~1000 FT.

AIRPORT TEMPERATURE

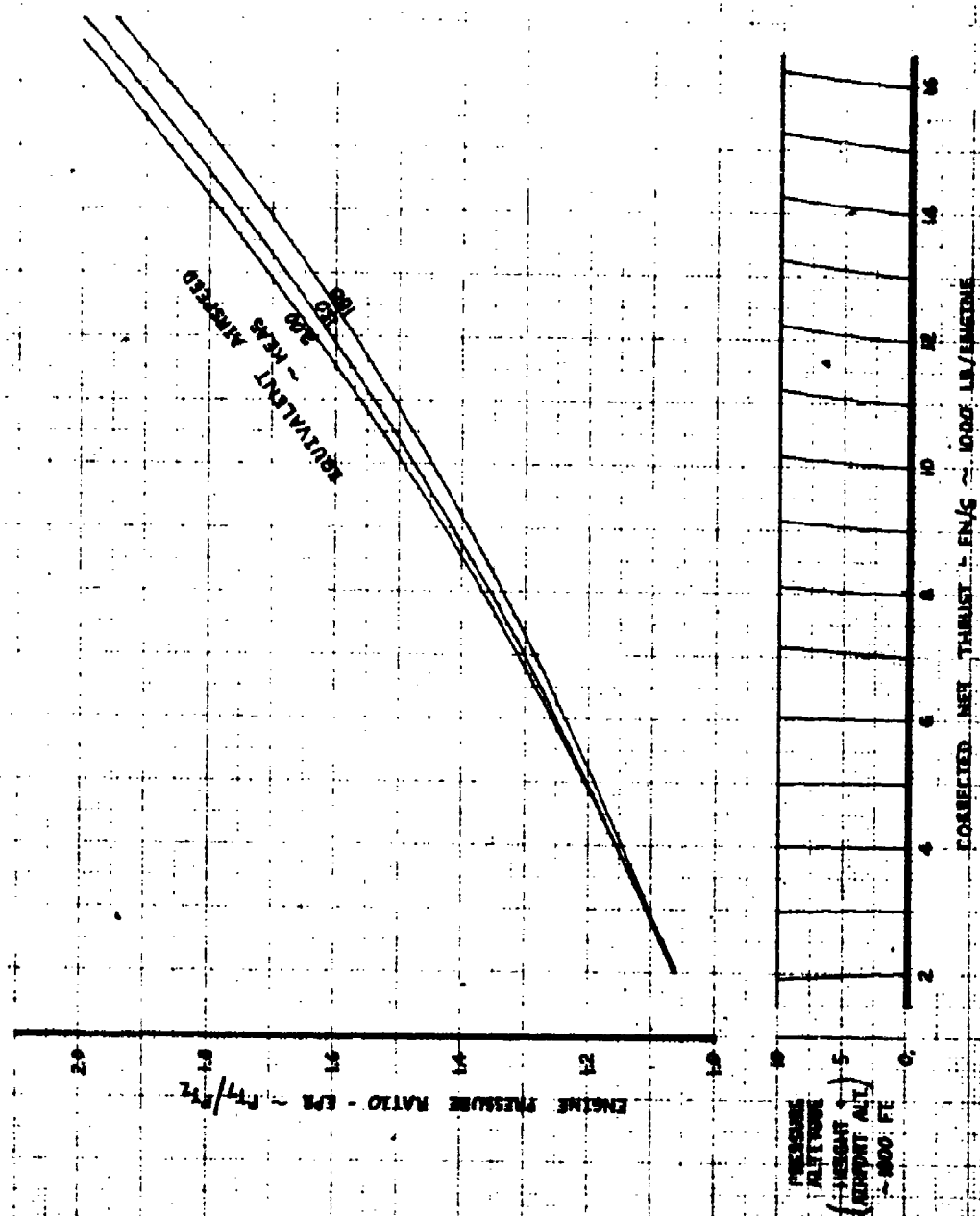
TAKEOFF NET THRUST ~ 5000 LB/ENGINE

CALC	R.E. BUSHAG	8-21-73	REVISED	DATE
CHECK	LARSON	9-25-73	R.F.B.	10-15-73
APP			✓ FRASER	10-16-73
APP				
INK	SCHROETER			

GENERALIZED TAKEOFF THRUST
JT3D-3 AVG. ENGINES

THE BOEING COMPANY

707-120B
D6-42141-1
PAGE
7.1.10



CALC	R. E. BUCKLEY	9-10-73	REVISED	DATE	CONVERSION CHART CORRECTED NET THRUST TO ENGINE PRESSURE RATIO JT3D-3, JT3D-1	707-1208
CHECK	LARSON	9-25-73				7208
APR						D6-42M1-1
APR						
INH	W. G. BROOKS	9/11/73			THE BOEING COMPANY	PAGE 7.1.11

207-3208

JT30-38 ENGINES

UNTREATED

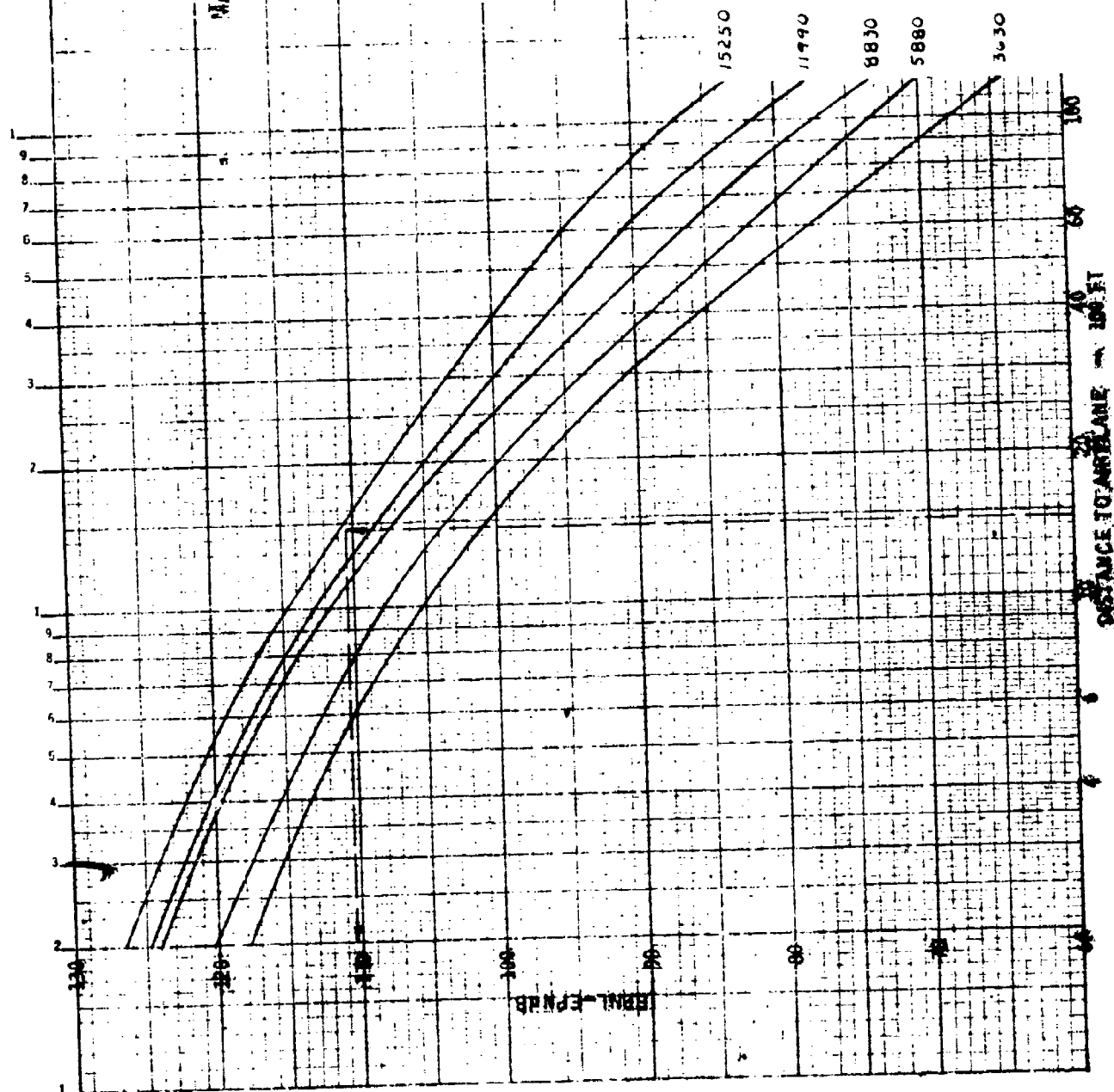
MADERA LEVEL FLYOVERS

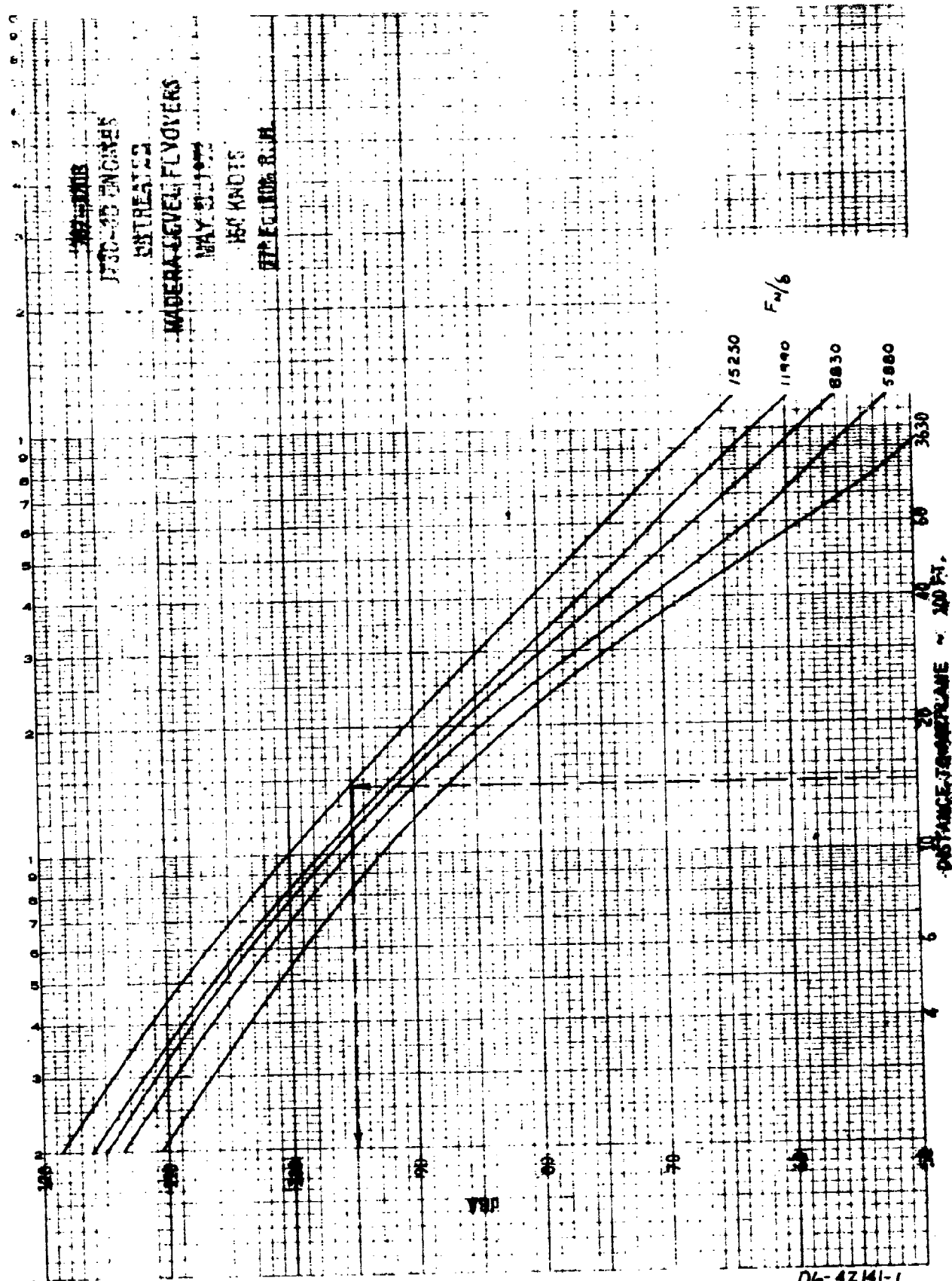
MAY 31, 1972

160 KNOTS

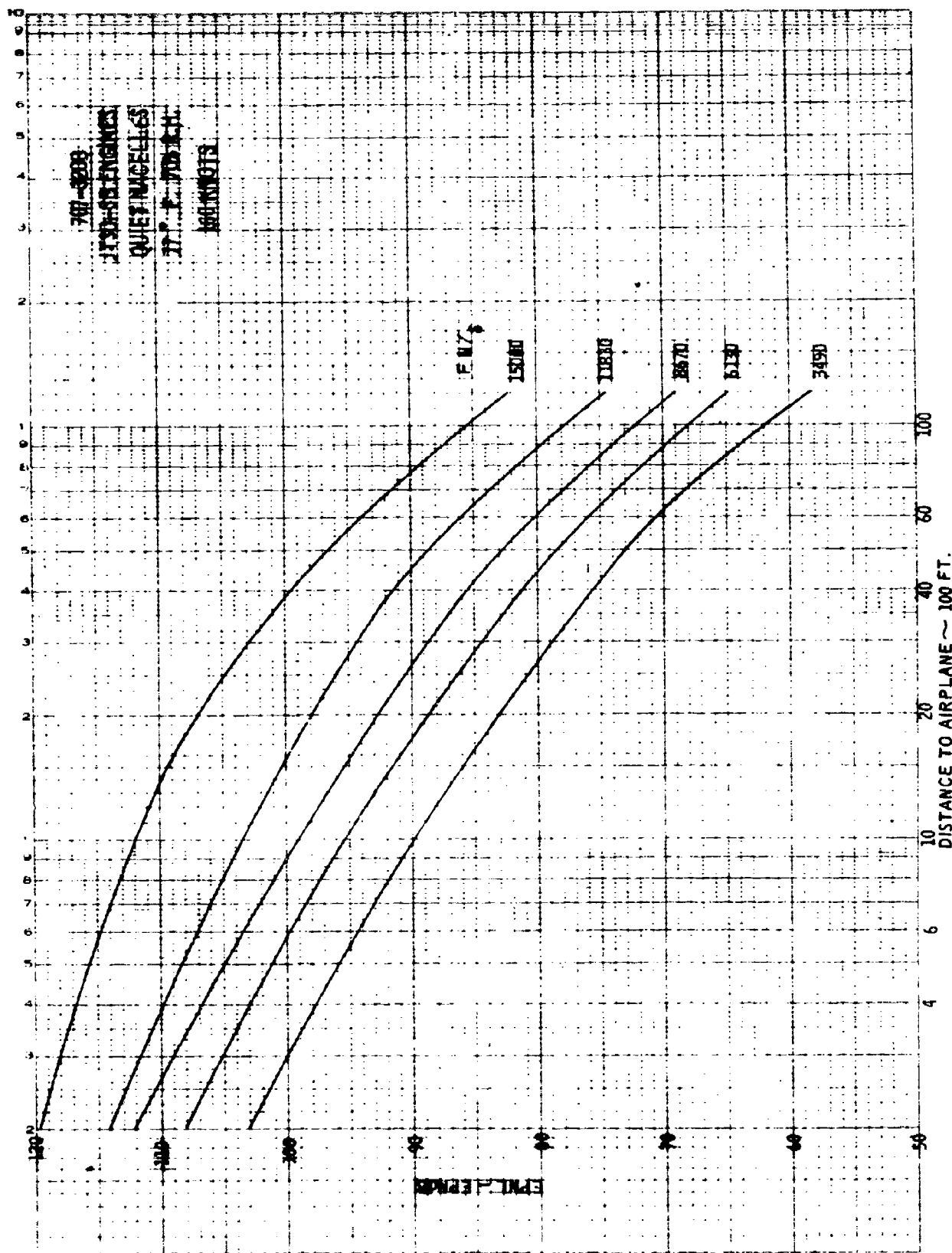
70° E 70% RH

F_{4.6}





3 CYCLES = 10 DIVISIONS PER INCH



707-3278

JT3D-3B ENGINE

ONE MAGNET

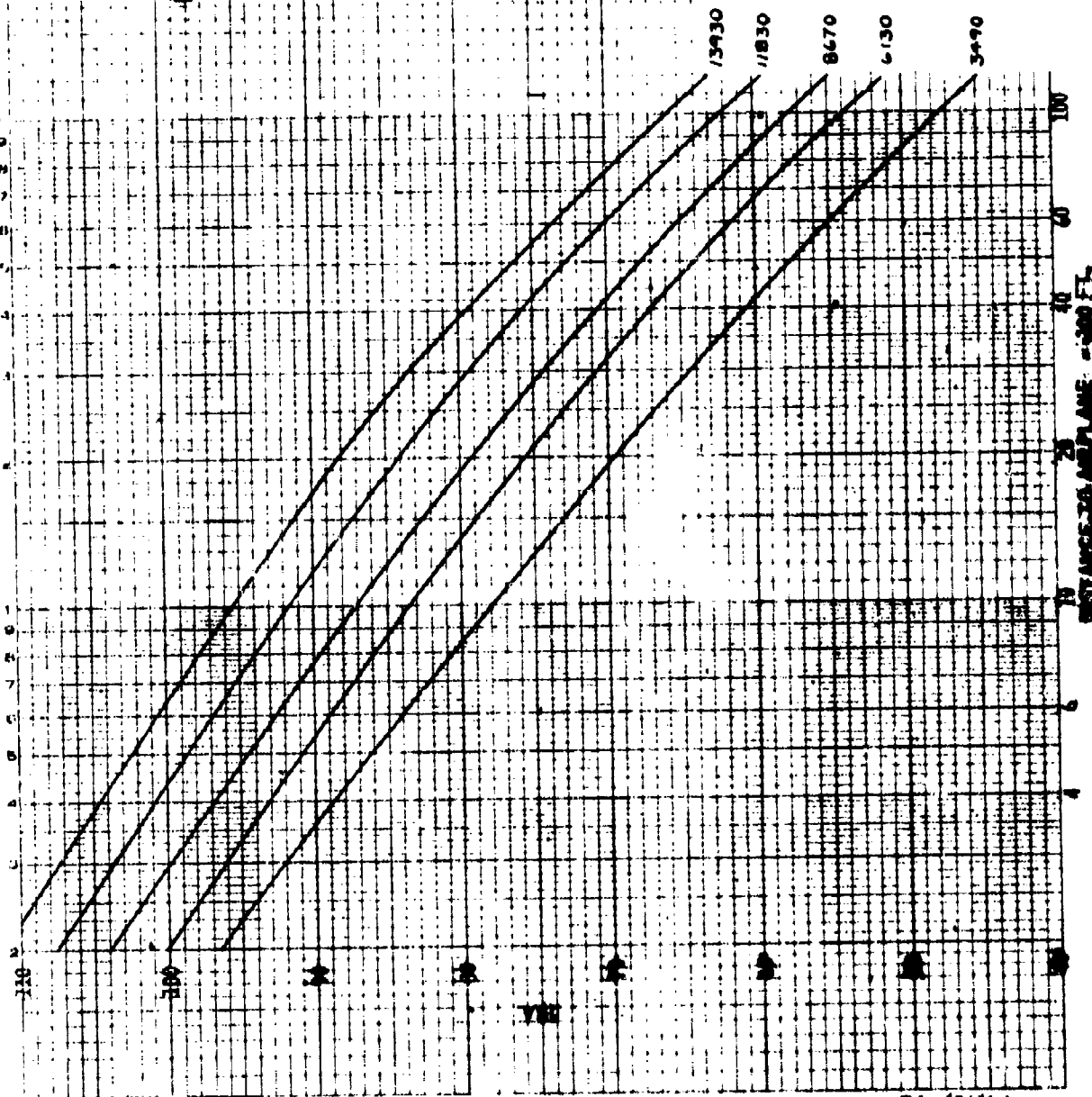
NUMBER OF MAGNETS

100 KNOTS

100 KNOTS

27° F. 70° F. H.

$r_w/6$



7.2 720 B Aircraft with JT3D-1 Engines

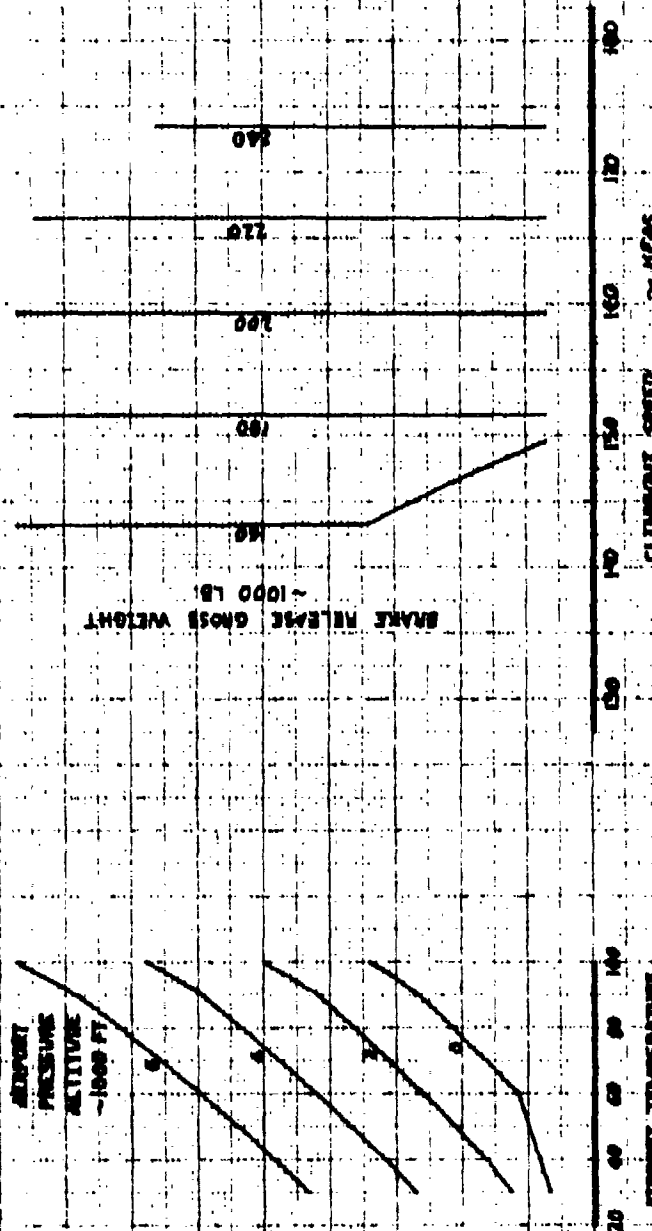
REV SYM

BEING | NO D6-42141-1
PAGE 7.2



ALL ENGINE CLIMBOUT SPEED
V₂ ± 0.475

FLAPS 20°



CALC	R.E. BULLANE	9-10-73	REVISED	DATE
CHECK	FRASER	9-29-73		
APP				
APP				
ENH	W.G. BROOKS	9/10/73		

ALL ENGINE CLIMBOUT SPEED
FLAPS 20°
JT3D-1 ENGINES

THE BOEING COMPANY

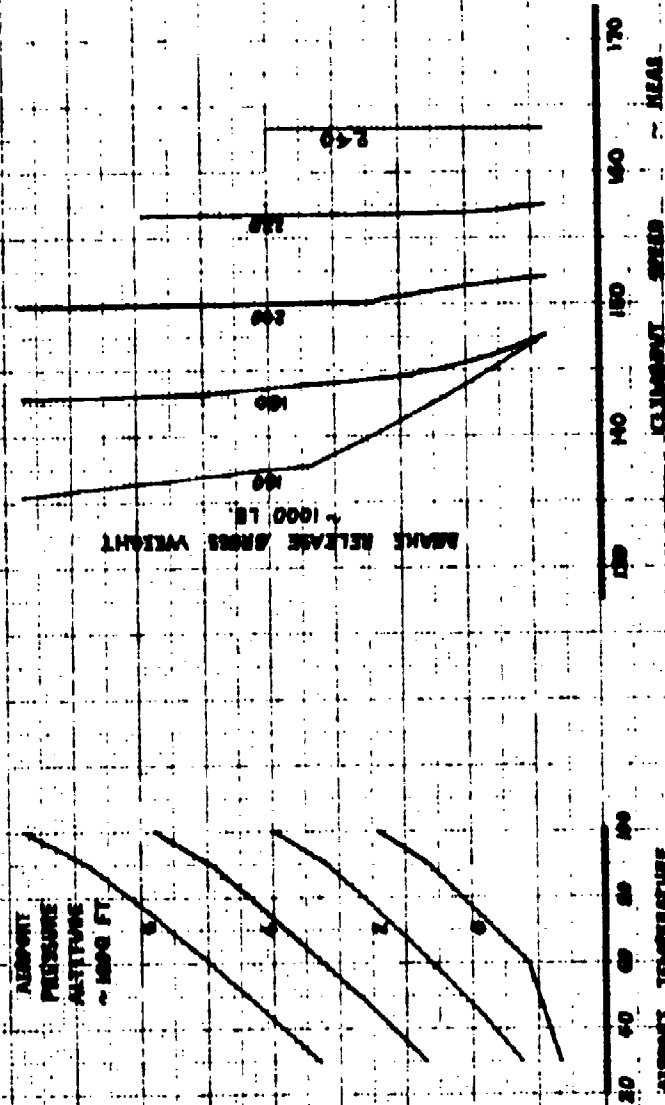
720 B

DG-4244-1

PAGE
7.2.1

ALL ENGINE CLIMBOUT SPEED
V₂ 10K73

FLAPS 30°



CLIMBOUT SPEED - KIAS

CALC	A.E. BULLALD	9-10-73	REVISED	DATE	ALL ENGINE CLIMBOUT SPEED FLAPS 30° JT3D-1 ENGINES	7208
CHECK	FRASGR	9-24-73				06-42M1-1
APR					THE BOEING COMPANY	PAGE
APR						7.2.2
INK	W.B. BROOKS	9/10/73				

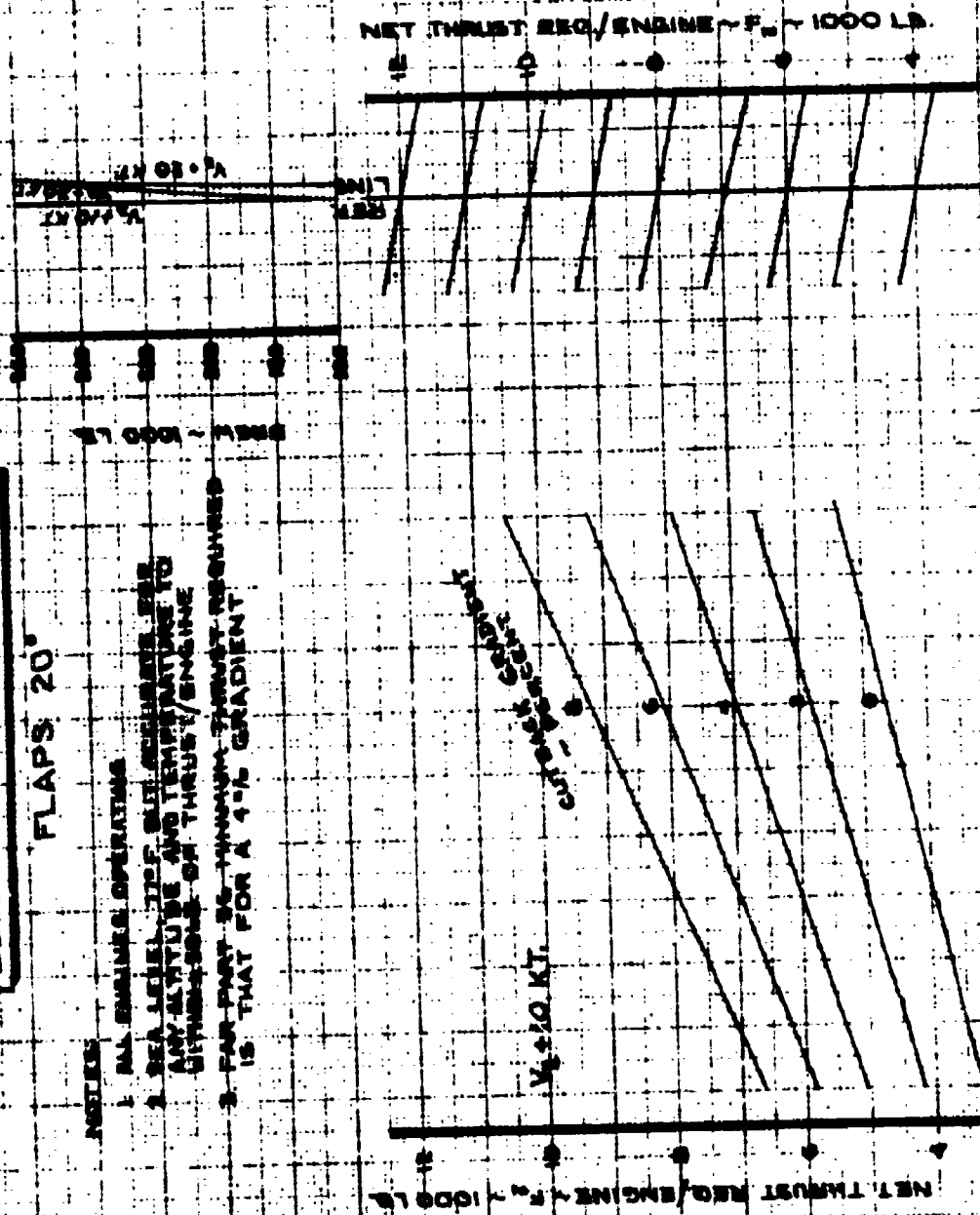
SPEED REGISTRATION

CUTBACK THRUST REQUIRED

FLAPS 20°

NOTES

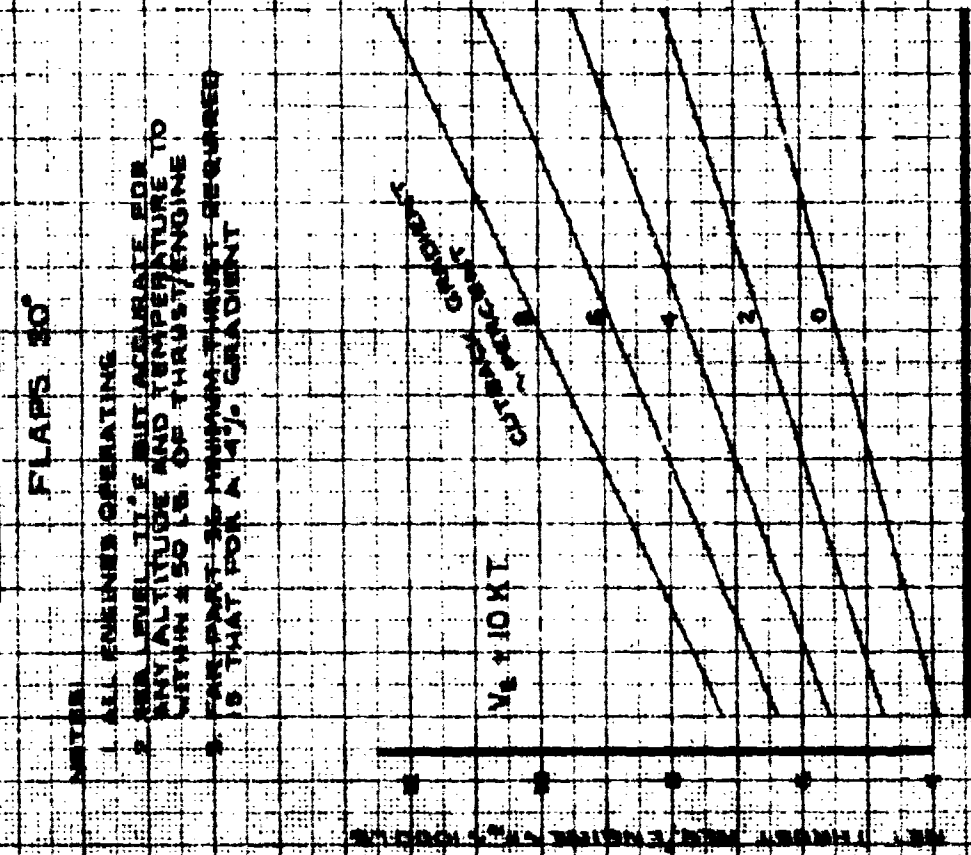
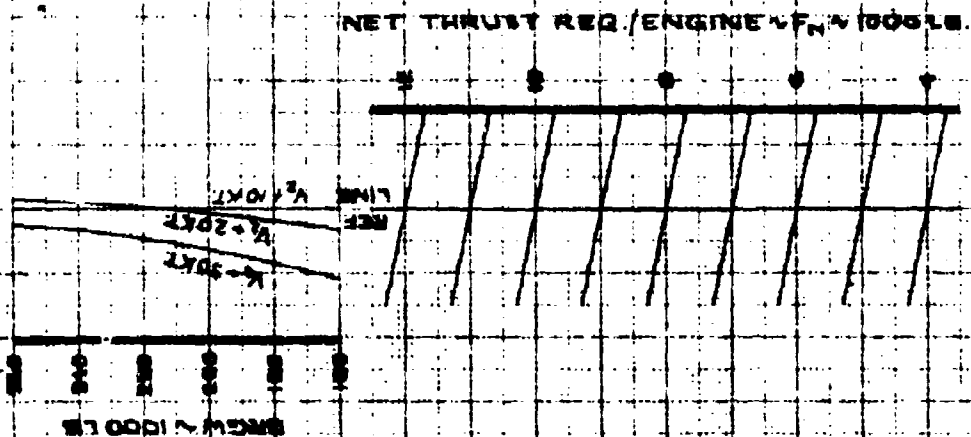
1. ALL ENGINES OPERATING
2. SEA LEVEL, 11°F. SLT. REQUIRED FOR ANY ALTITUDE AND TEMPERATURE TO 11,000 FT. OR THRUST/ENGINE
3. FOR PART 50-TUNING, THRUST REQUIRED IS THAT FOR A 4% GRADIENT



CALC	R.S. Buchholz	9-11-73	REVISED	DATE	CUTBACK THRUST REQUIRED	720 B
CHECK	FRASER	12-6-73	A E B	11/14/73	$V_2 + 10$ KT. FLAPS 20°	D6-42141-1
APR					THE BOEING COMPANY	PAGE 7.2.3
APR						

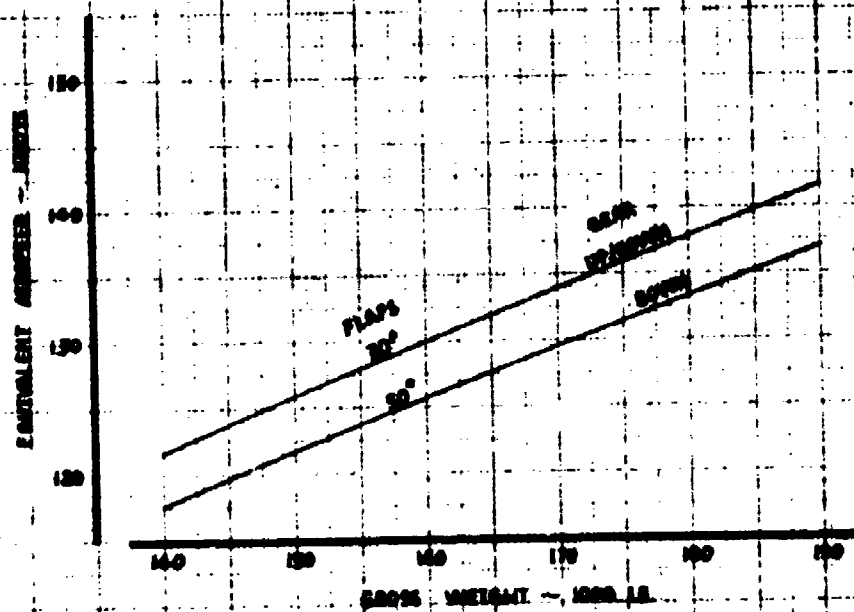
CUTBACK THRUST REQUIRED

FLAPS 30°



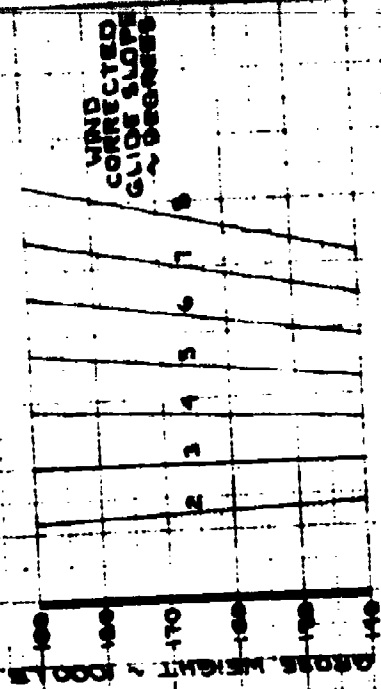
NOTE: 1. ALL ENGINES OPERATING
2. SEA LEVEL 17.5 BUT ACCURATE FOR ANY ALTITUDE AND TEMPERATURE TO WITHIN ± 50 LB. OF THRUST/ENGINE
3. CARE MUST BE TAKEN THAT THRUST REQUIRED IS THAT FOR A 4% GRADIENT

CALC	RE Buehler	8-25-73	REVISED	DATE	CUTBACK THRUST REQUIRED	720B
CHECK	FRASER	1-24-73	RE B	11-19-73	$V_2 + 10KT$	FLAPS 30°
APP						06-42141-1
APP						PAGE
PLOT	SCHROETER	8-24-73			THE BOEING COMPANY	T 2.4



CALC	R. E. Buehler	9-10-73	REVISED	DATE	APPROACH SPEED 1.3 V ₃	7208
CHECK	FRASER	9-29-73				DL-42141-1
APP					THE BOEING COMPANY	PAGE
APP						7.2.5
ENR	W. O. BROOKS	9/11/73				

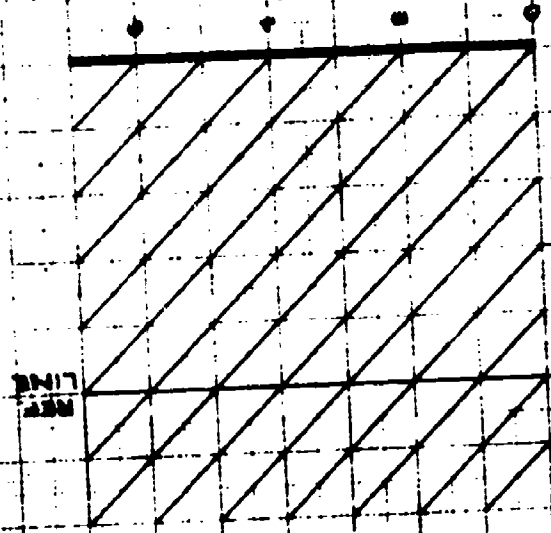
GLIDE SLOPE CORRECTION



APPROACH THRUST REQUIRED

1.3 V_S

NET THRUST REQUIRED/ENGINE
~ 1000 LB



GLIDE SLOPE
ZERO WIND

FLAPS DOWN
30°

DOWN
30°

GROSS WEIGHT ~ 1000 LB

NET THRUST REQUIRED/ENGINE
~ 1000 LB

CALC	B.G. Williams	8-21-72	REVISED	DATE
CHECK	FRASER	9-29-73		
APP				
APP				

APPROACH THRUST REQUIRED

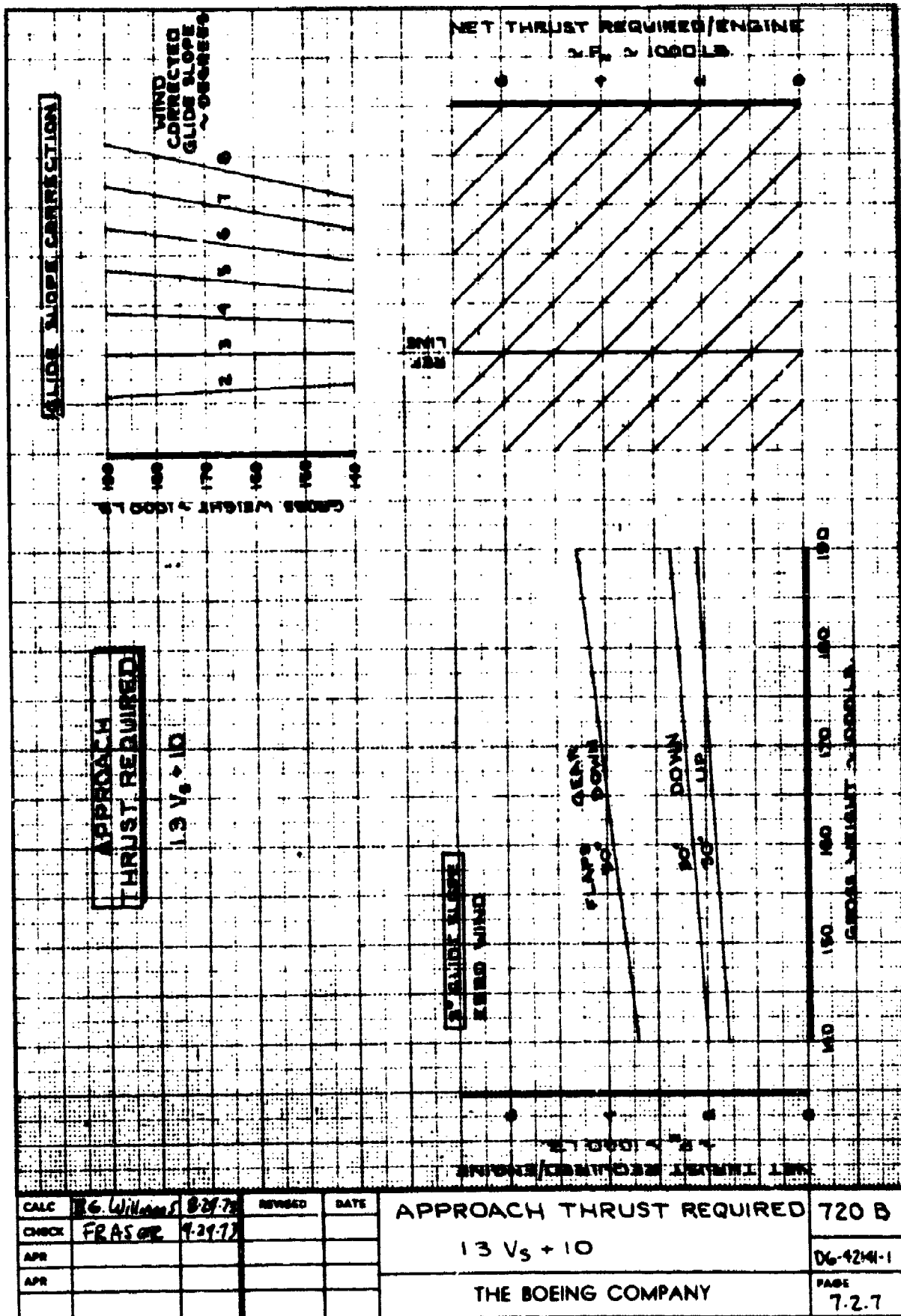
1.3 V_S

THE BOEING COMPANY

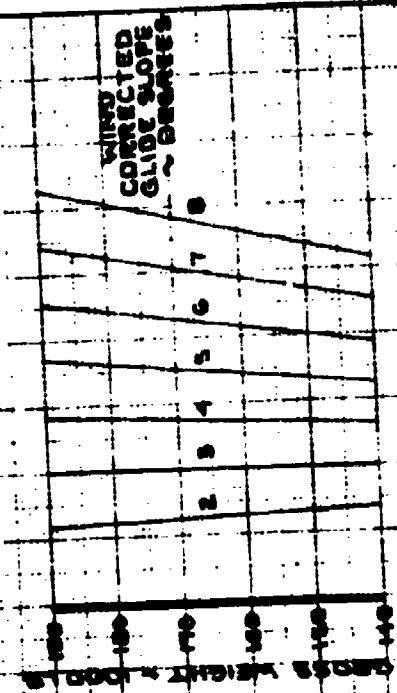
720 B

D6-42141-1

PAGE 7.2.6



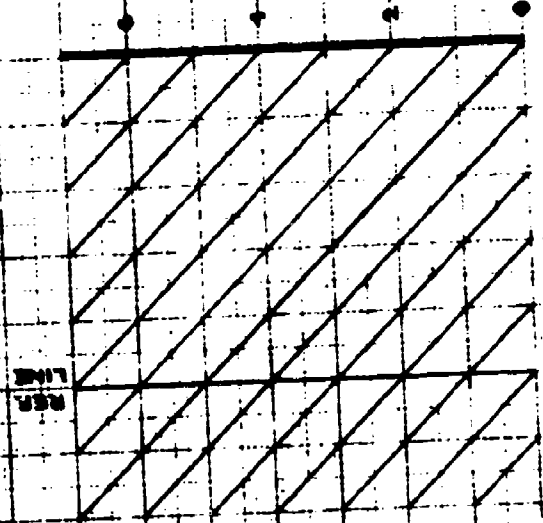
GLIDE SLOPE CORRECTION



APPROACH THRUST REQUIRED

$1.3 V_s + 20$

NET THRUST REQUIRED/ENGINE
 $\geq 1000 \text{ LB.}$



GLIDE SLOPE

ZERO WIND

FLAPS DOWN

DOWN

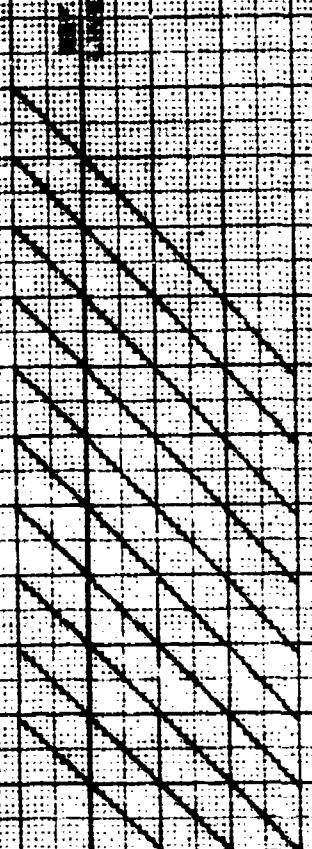
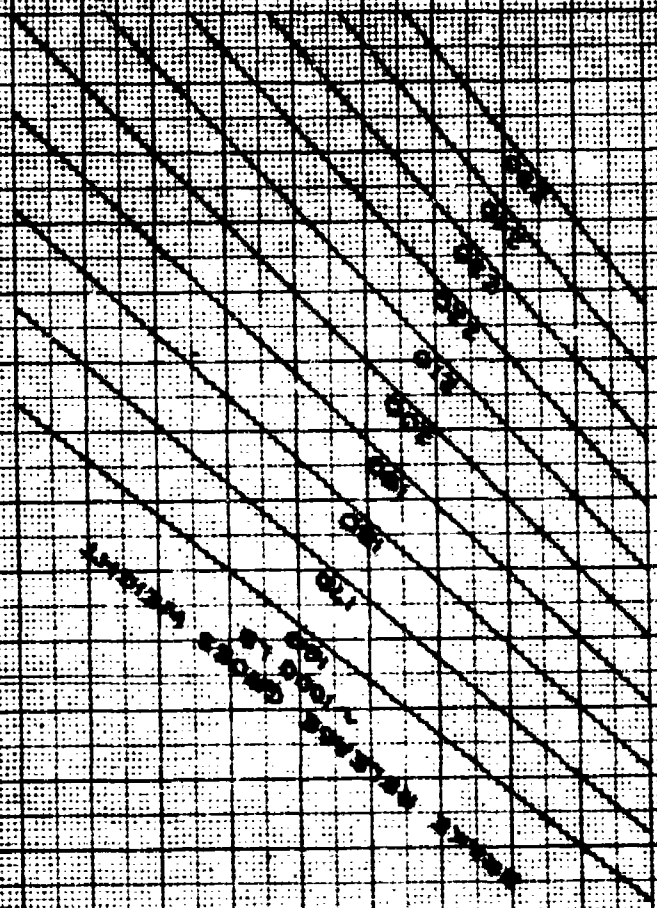
UP

GLIDE SLOPE ~ DEGREES

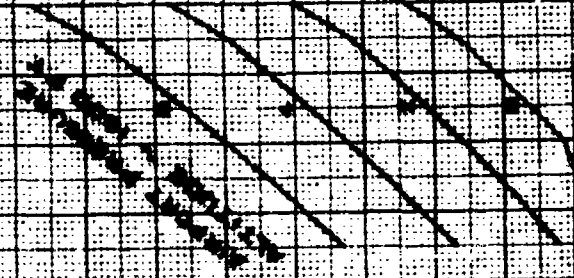
CALC	364/11/10	8-21-72	REVISED	DATE
CHECK	FRASER	9-24-72		
APR				
APR				

APPROACH THRUST REQUIRED
 $1.3 V_s + 20$
 THE BOEING COMPANY

720 B
 D6-42141-1
 PAGE
 7-2-8



100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740 760 780 800 820 840 860 880 900 920 940 960 980 1000



100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740 760 780 800 820 840 860 880 900 920 940 960 980 1000

100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740 760 780 800 820 840 860 880 900 920 940 960 980 1000

100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760	780	800	820	840	860	880	900	920	940	960	980	1000
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

NOTES

AT 10-11 ENGINES

1 10' FLAPS

1 2 T/C ON

140 160 180 200 220 240 260 280

EQUILIBRIUM BRAKE RELEASE PRESSURE (PSI) AT 10-11

BRIDGE THE
TOWERS TO BLOC

140

160

180

200

220

240

260

280

EQUILIBRIUM BRAKE RELEASE PRESSURE (PSI) AT 10-11

NOTES

1. 100% ENGINES

2. 30° FLAPS

3. 2 1/4 ON

100 150 200 250 300 350

EQUIVALENT BRAKE RELEASE PRESSURE WEIGHT (KG)

SEALING TYPE
NOMINAL NO. 1000

100 150 200 250 300 350

EQUIVALENT BRAKE RELEASE PRESSURE WEIGHT (KG)

10000 10000 10000 10000 10000 10000



11

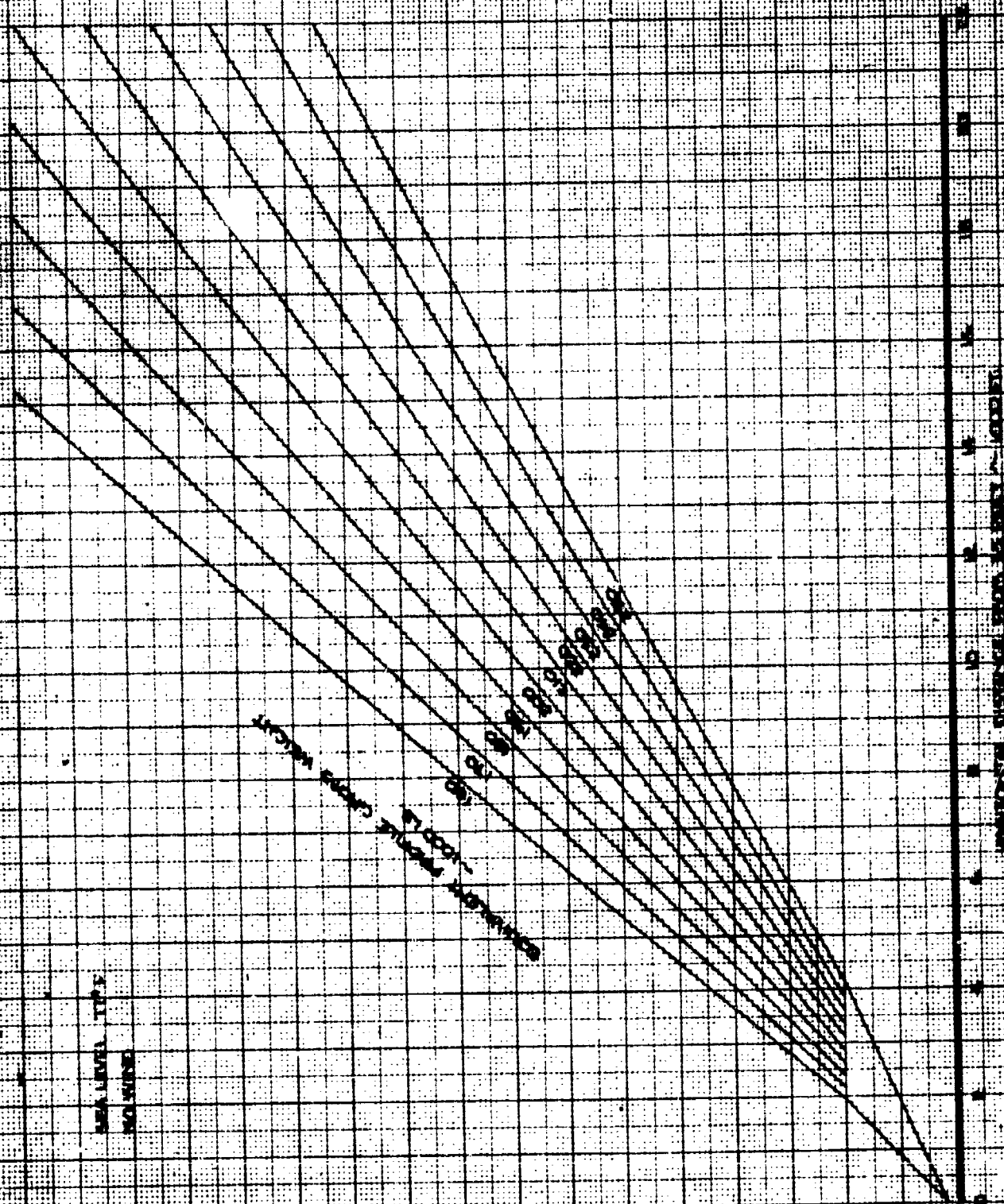
TRUCK OWNERS

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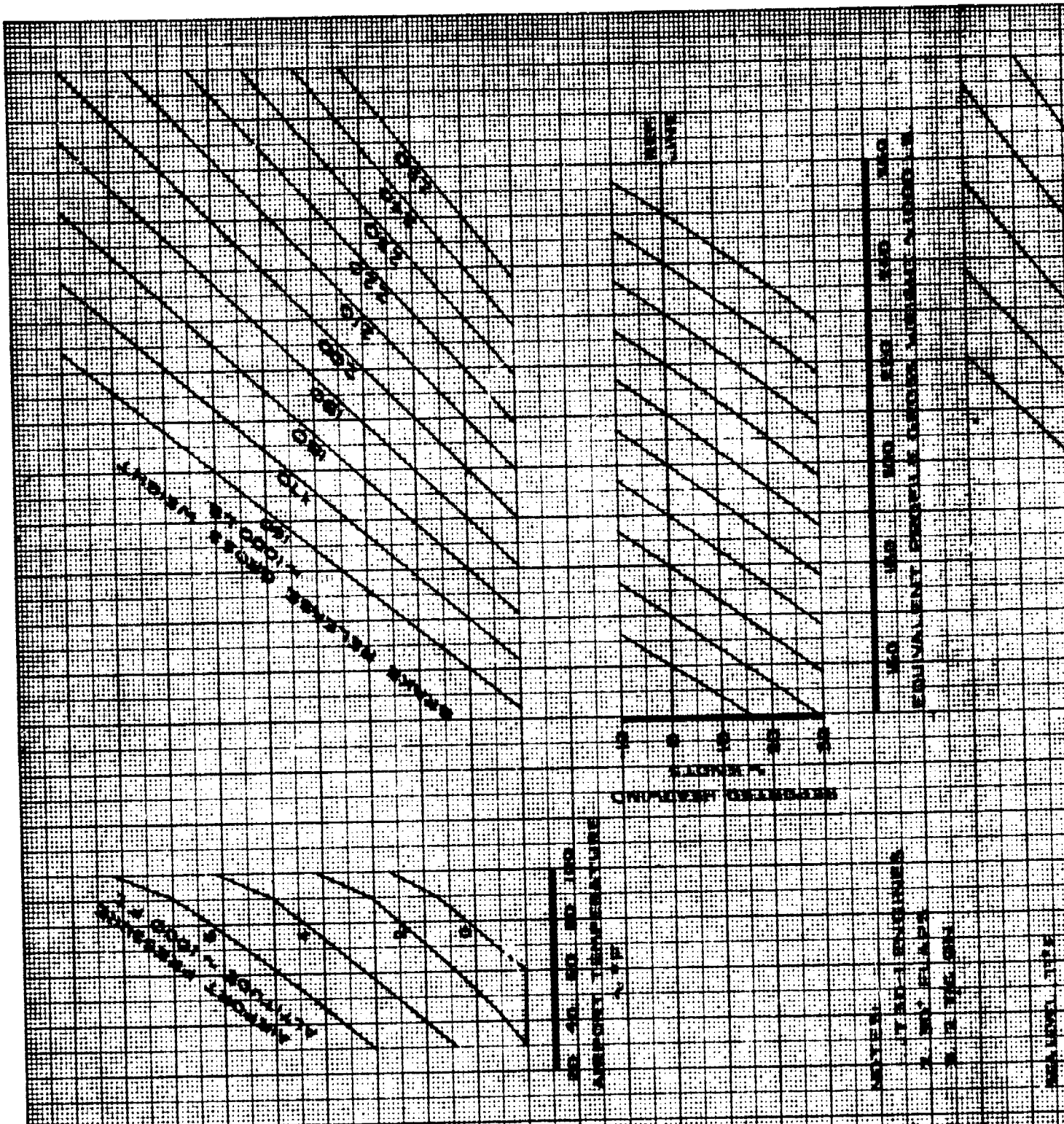
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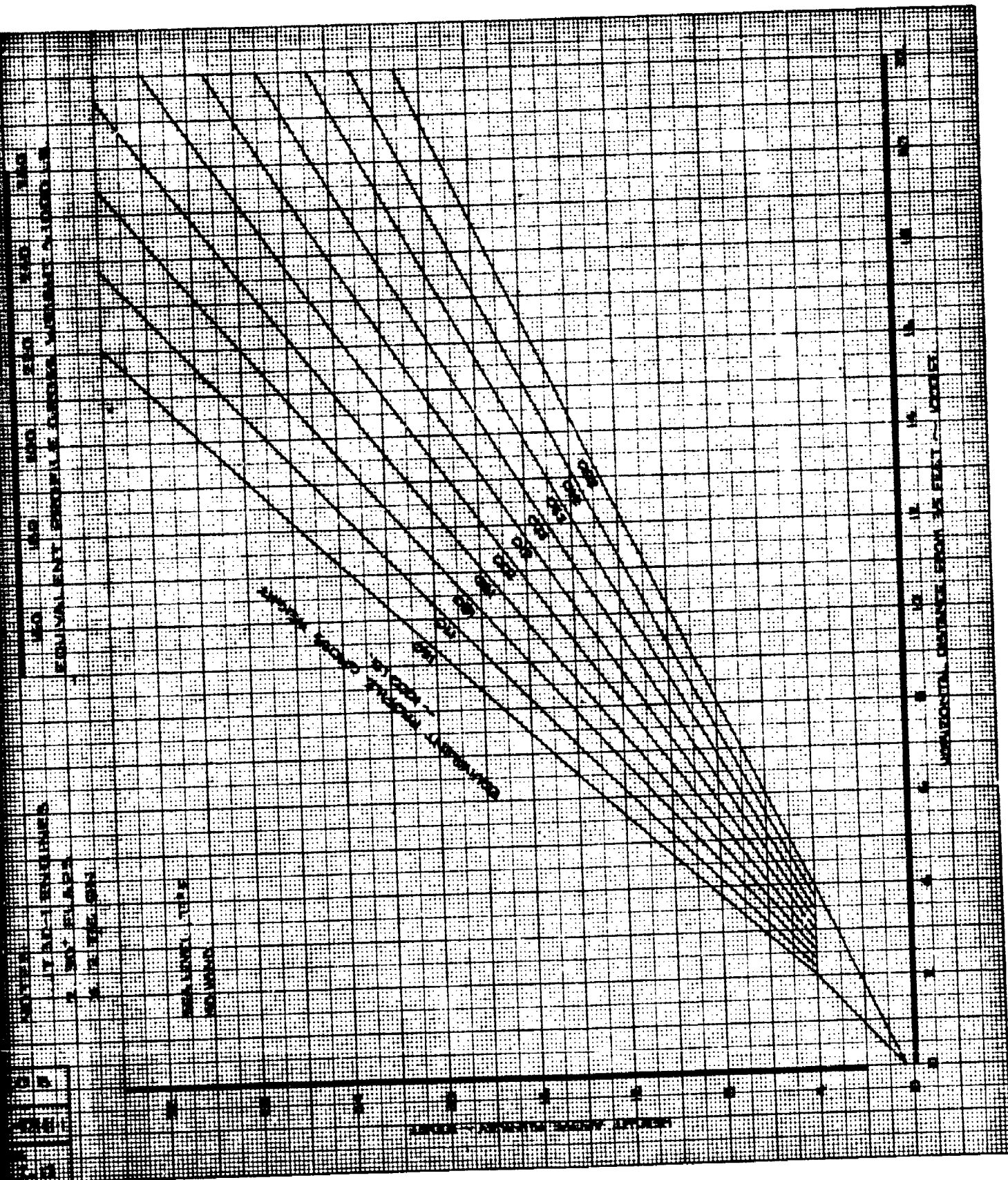
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OILWATER PROBEILLE GROSS WEIGHT - 1000 G					

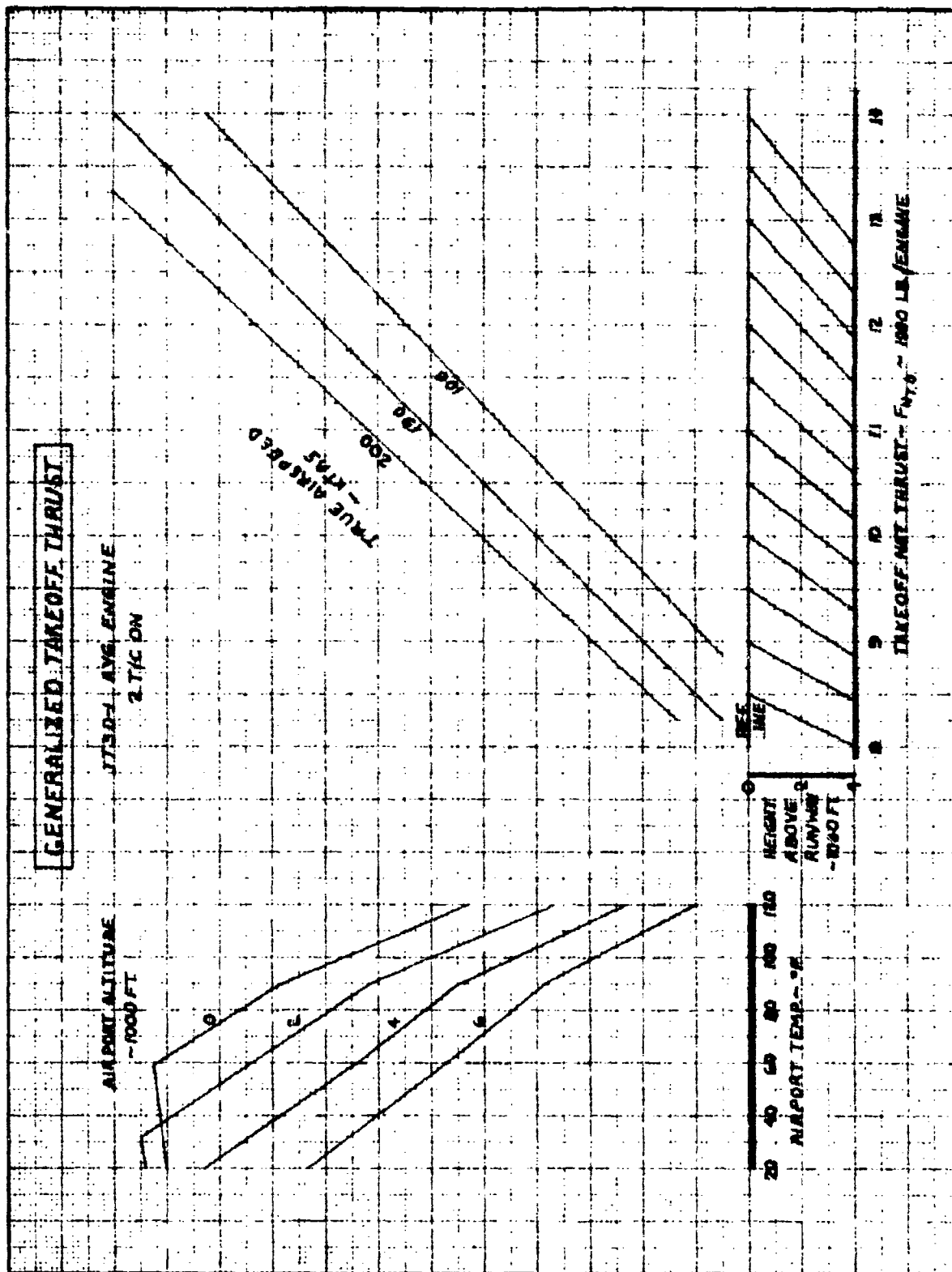


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NO.	ALPHA	BETA	THETA	PHI	ALL ENGINE CLIMBOUT PROFILE	TIME
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2	1.0	1.0	1.0	1.0	FLAPS 30°	1.0
3	1.0	1.0	1.0	1.0	AT 10,000 FT	1.0
4	1.0	1.0	1.0	1.0	AT 15,000 FT	1.0
5	1.0	1.0	1.0	1.0	AT 20,000 FT	1.0
6	1.0	1.0	1.0	1.0	AT 25,000 FT	1.0
7	1.0	1.0	1.0	1.0	AT 30,000 FT	1.0
8	1.0	1.0	1.0	1.0	AT 35,000 FT	1.0
9	1.0	1.0	1.0	1.0	AT 40,000 FT	1.0
10	1.0	1.0	1.0	1.0	AT 45,000 FT	1.0
11	1.0	1.0	1.0	1.0	AT 50,000 FT	1.0
12	1.0	1.0	1.0	1.0	AT 55,000 FT	1.0
13	1.0	1.0	1.0	1.0	AT 60,000 FT	1.0
14	1.0	1.0	1.0	1.0	AT 65,000 FT	1.0
15	1.0	1.0	1.0	1.0	AT 70,000 FT	1.0
16	1.0	1.0	1.0	1.0	AT 75,000 FT	1.0
17	1.0	1.0	1.0	1.0	AT 80,000 FT	1.0
18	1.0	1.0	1.0	1.0	AT 85,000 FT	1.0
19	1.0	1.0	1.0	1.0	AT 90,000 FT	1.0
20	1.0	1.0	1.0	1.0	AT 95,000 FT	1.0
21	1.0	1.0	1.0	1.0	AT 100,000 FT	1.0





CALC	REBUELLI	8-30-73	REVISED	DATE
CHECK	FRASER	9-29-73	R. G. S.	10-15-73
APR			✓FRASER	10-16-73
APR				
INK	SCHROETER			

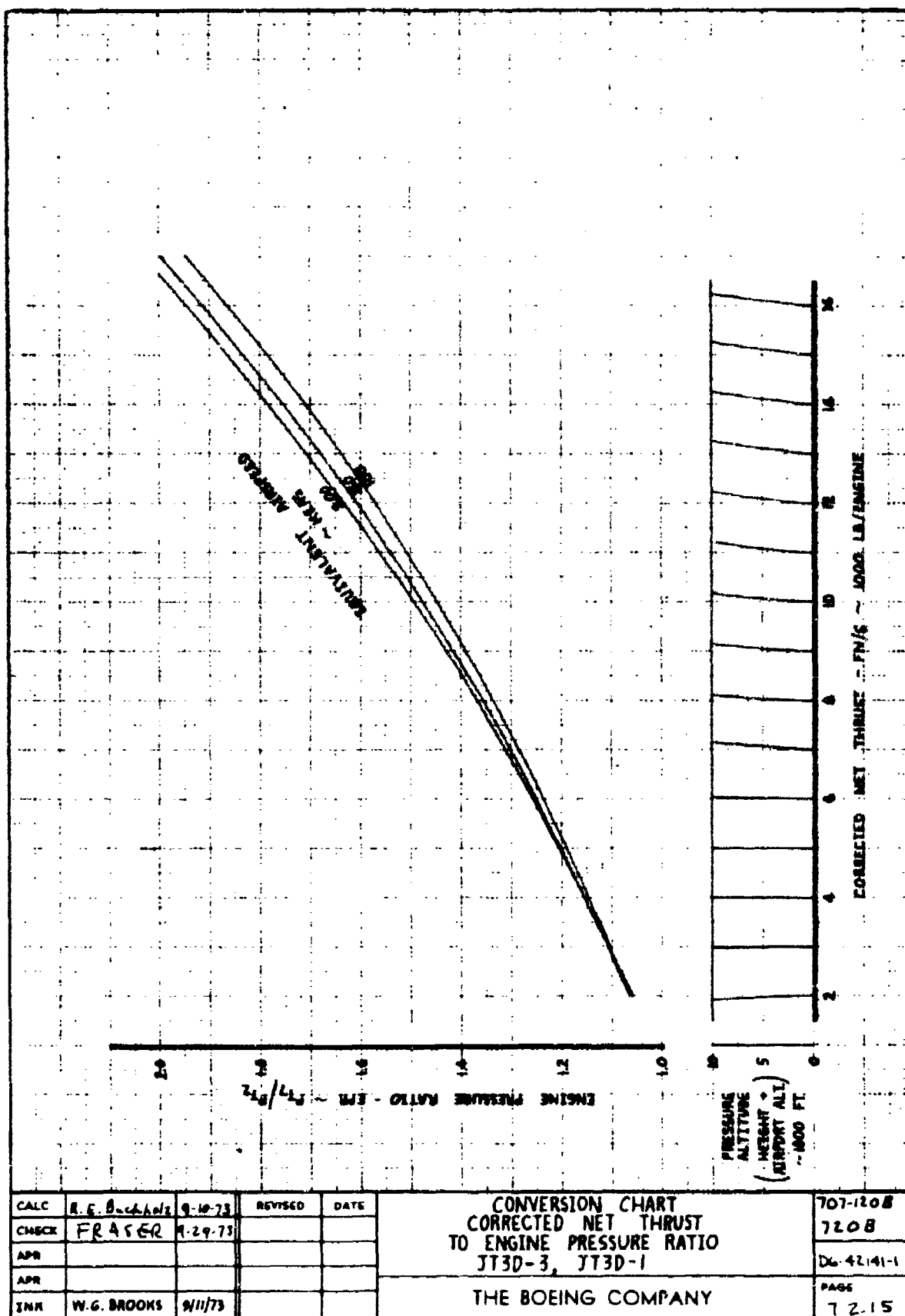
GENERALIZED TAKEOFF THRUST
JT3D-1 AVG ENGINES

THE BOEING COMPANY

720 B

D6-42141-1

PAGE
7.2.14



7.3

797-300B Advanced/C Aircraft with JT3D-3B(1C) Engines

REV SYM

BOEING No D6-42141-1
PAGE 7.3

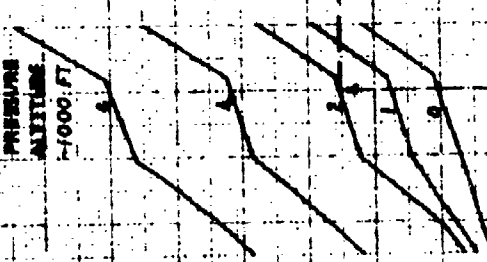


ALL ENGINE CLIMBOUT SPEED
V₂ ± 10 KTS.

FLAPS 14°

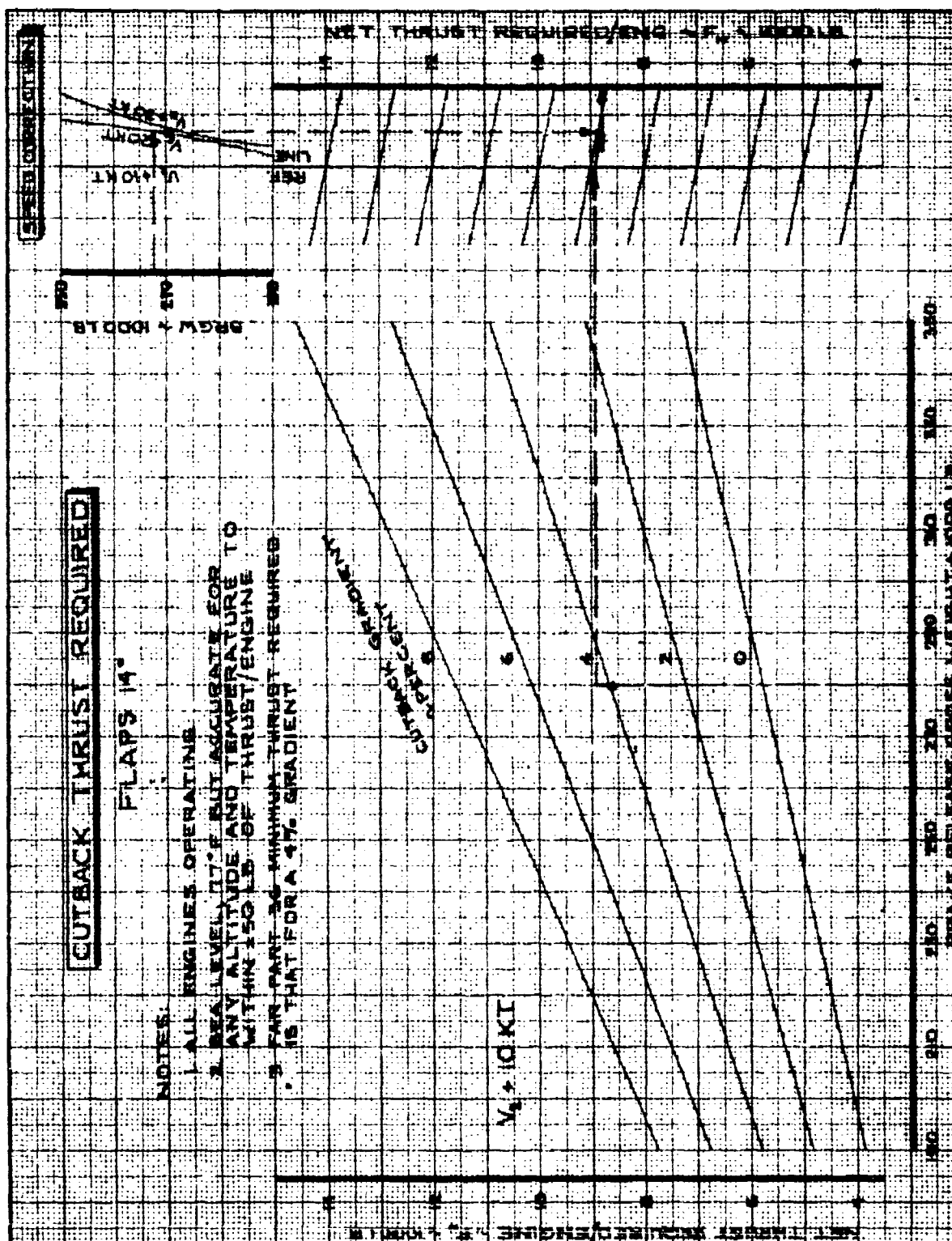
GRADE WEIGHT
~1000 LB.

AIRPORT
PRESSURE
ALTITUDE
±1000 FT.

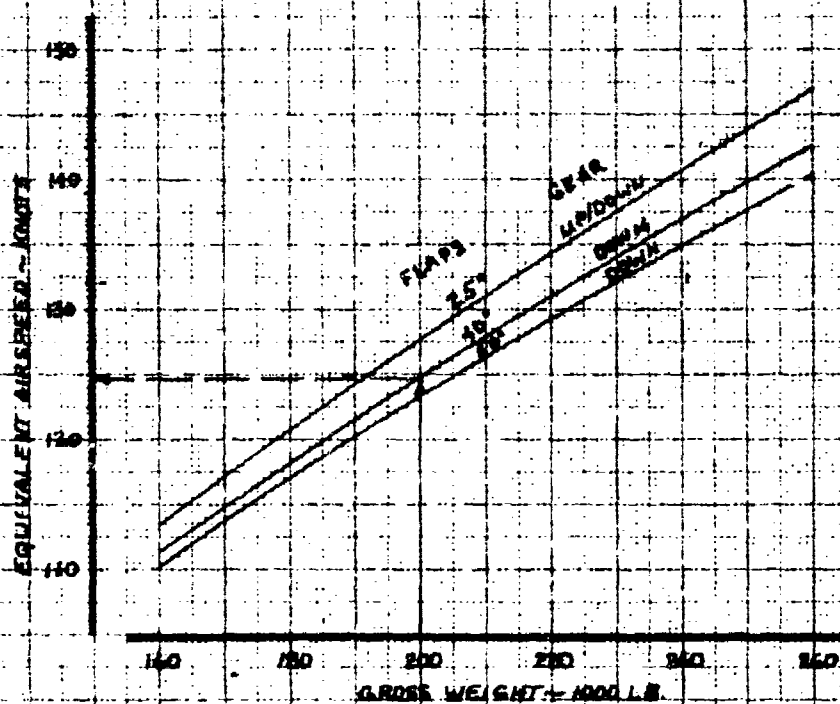


CLIMBOUT SPEED
~1000 LB.
AIRSPEED TEMPERATURE
~1000 LB.

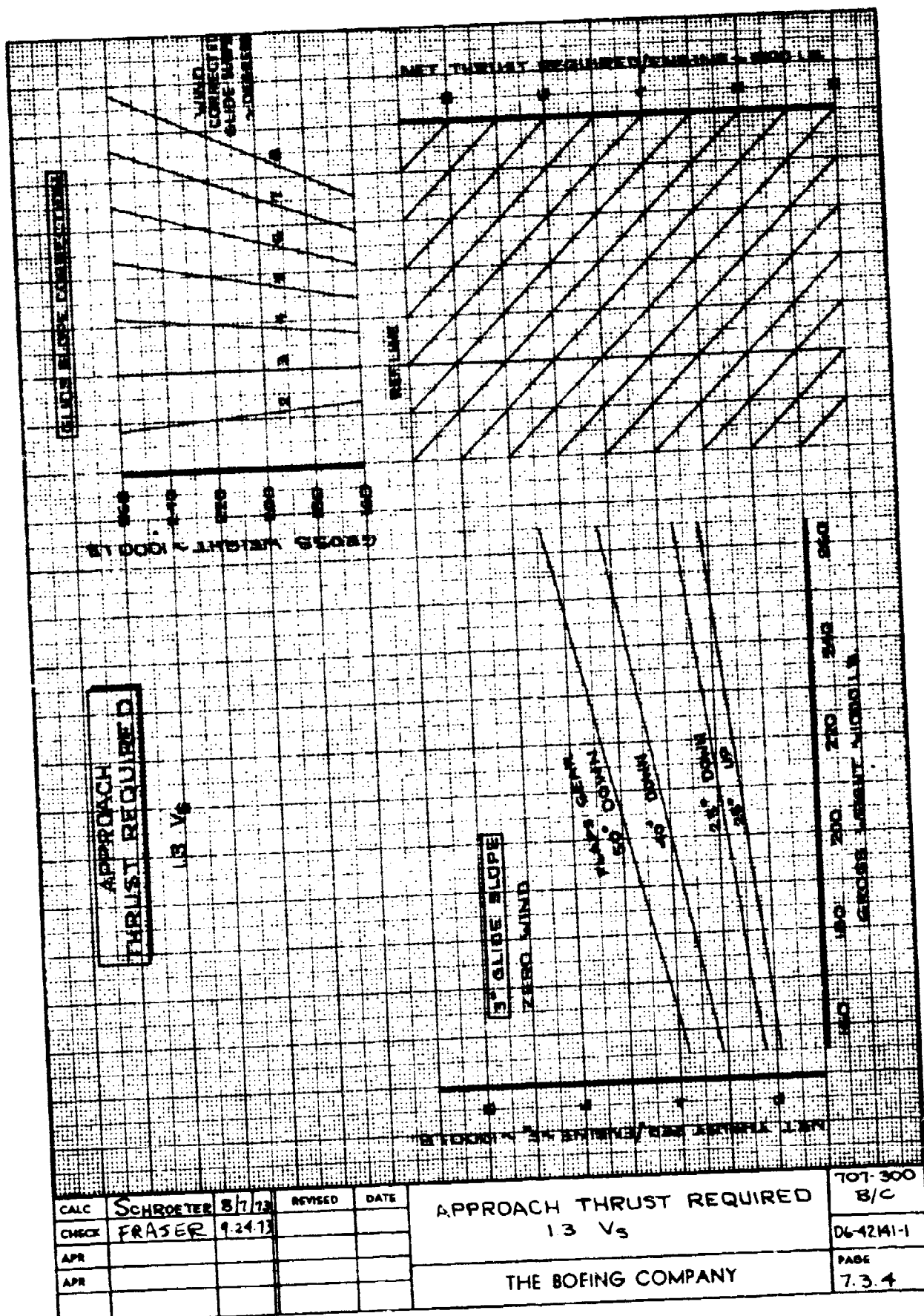
CALC	R.F. BULLOCK	9-7-73	REVISED	DATE	ALL ENGINE CLIMBOUT SPEED FLAPS 14° JT3D-38(IC) ENGINES THE BOEING COMPANY	707-300
CHECK	FRASER	9-24-73				BAW-IC
APP						DC-42141-1
APP						PAGE
INK	W.G. BROOKS	9/10/73				7.3.1



CALC	SCHROETER	8/8/73	REVISED	DATE	CUTBACK THRUST REQUIRED	707-300
CHECK	FRASER	9-24-73			V ₂ + 10 KT	BAV/C
APR					FLAPS 14°	06-42/41-1
APR					THE BOEING COMPANY	PAGE
INK	SCHROETER					7.3.2



CALC	R.E. Buchholz	9-26-73	REVISED	DATE	APPROACH SPEED 13VS	707-300
CHECK	B.G. Williams	9-26-73				B/C
APR					THE BOEING COMPANY	D6-42M-1
APR						PAGE
INK	SCHROETER					7.3.3



CALC	SCHROETER	8/7/73	REVISED	DATE
CHECK	FRASER	9/24/73		
APR				
APR				

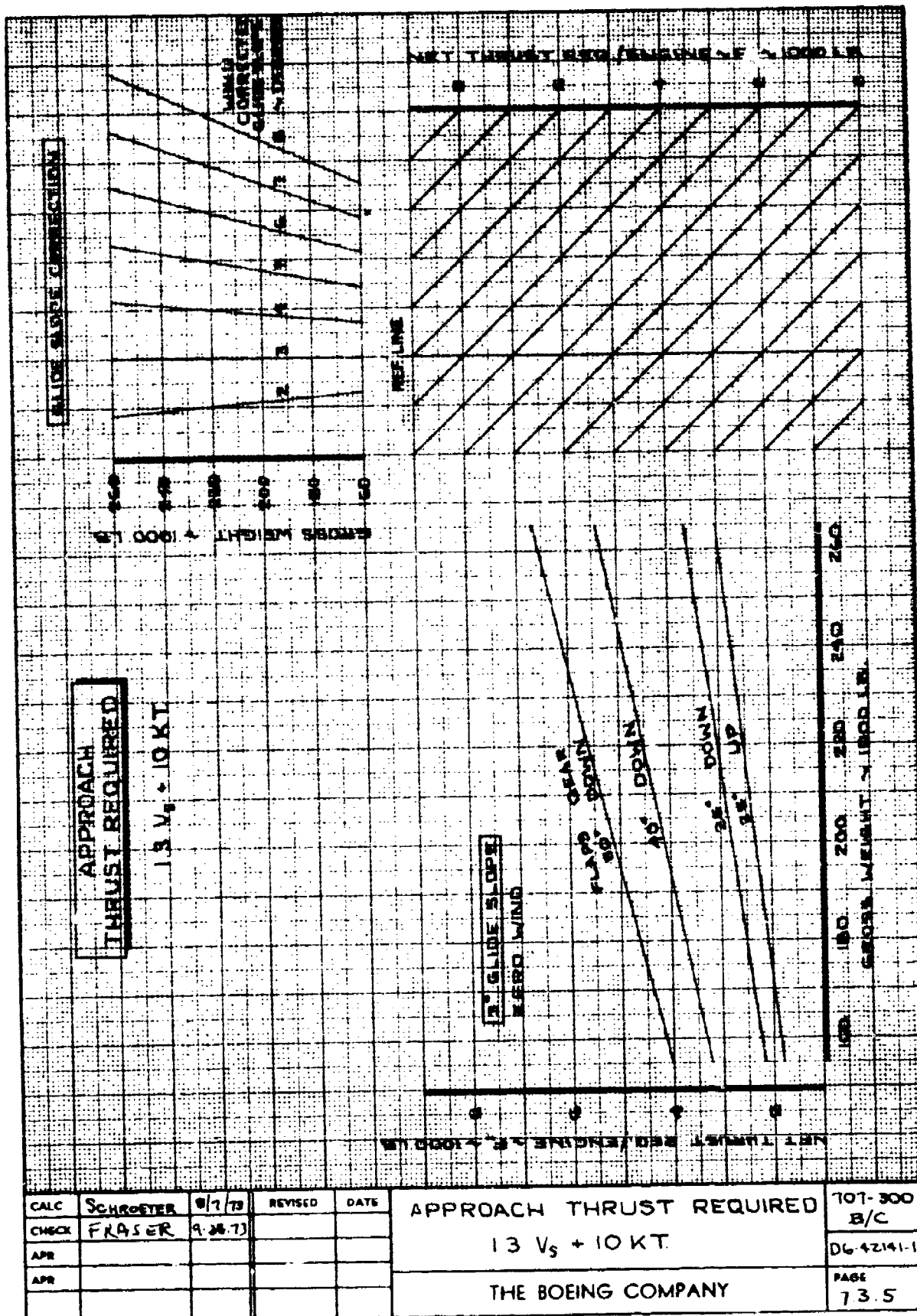
APPROACH THRUST REQUIRED
13 VS

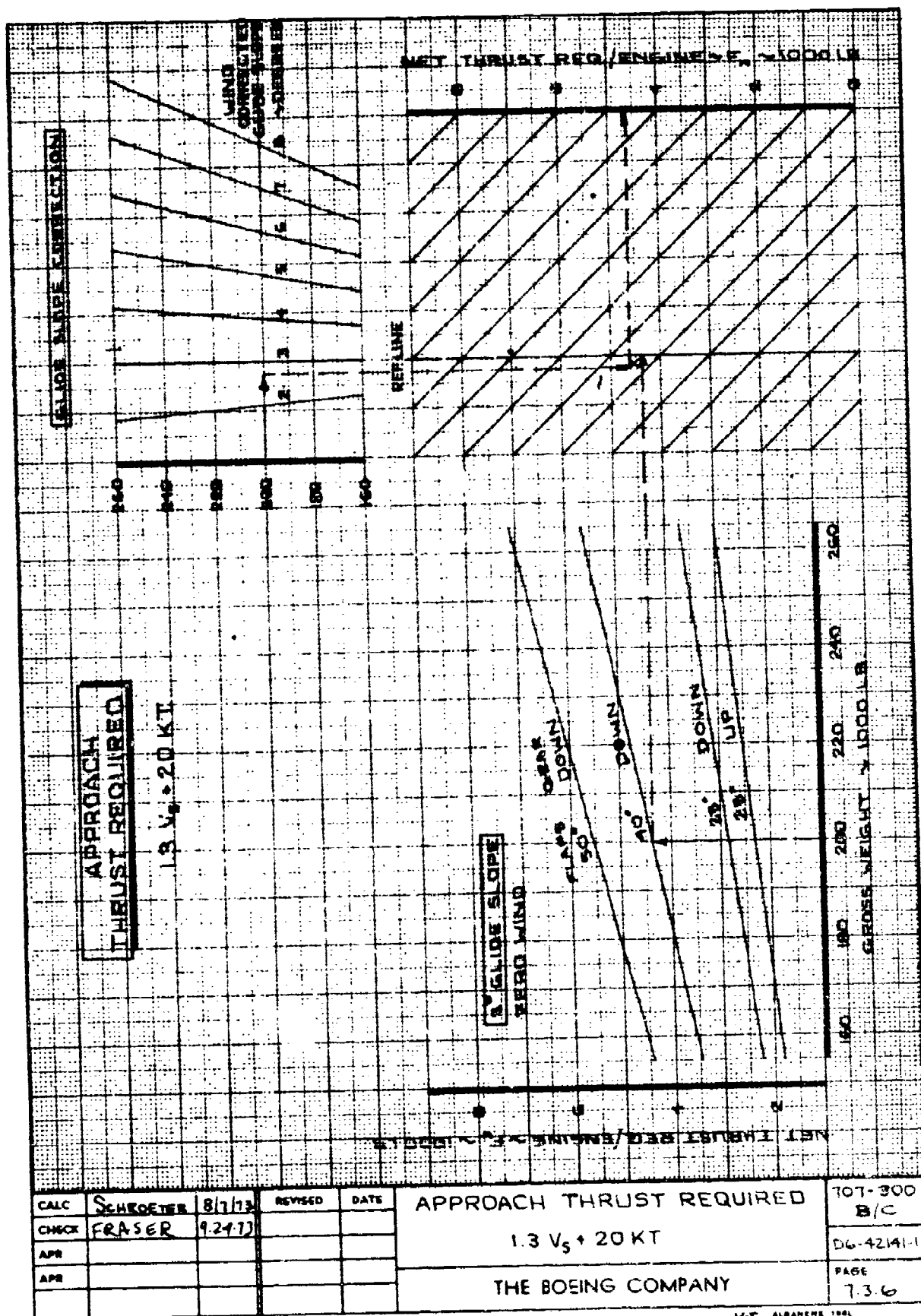
THE BOEING COMPANY

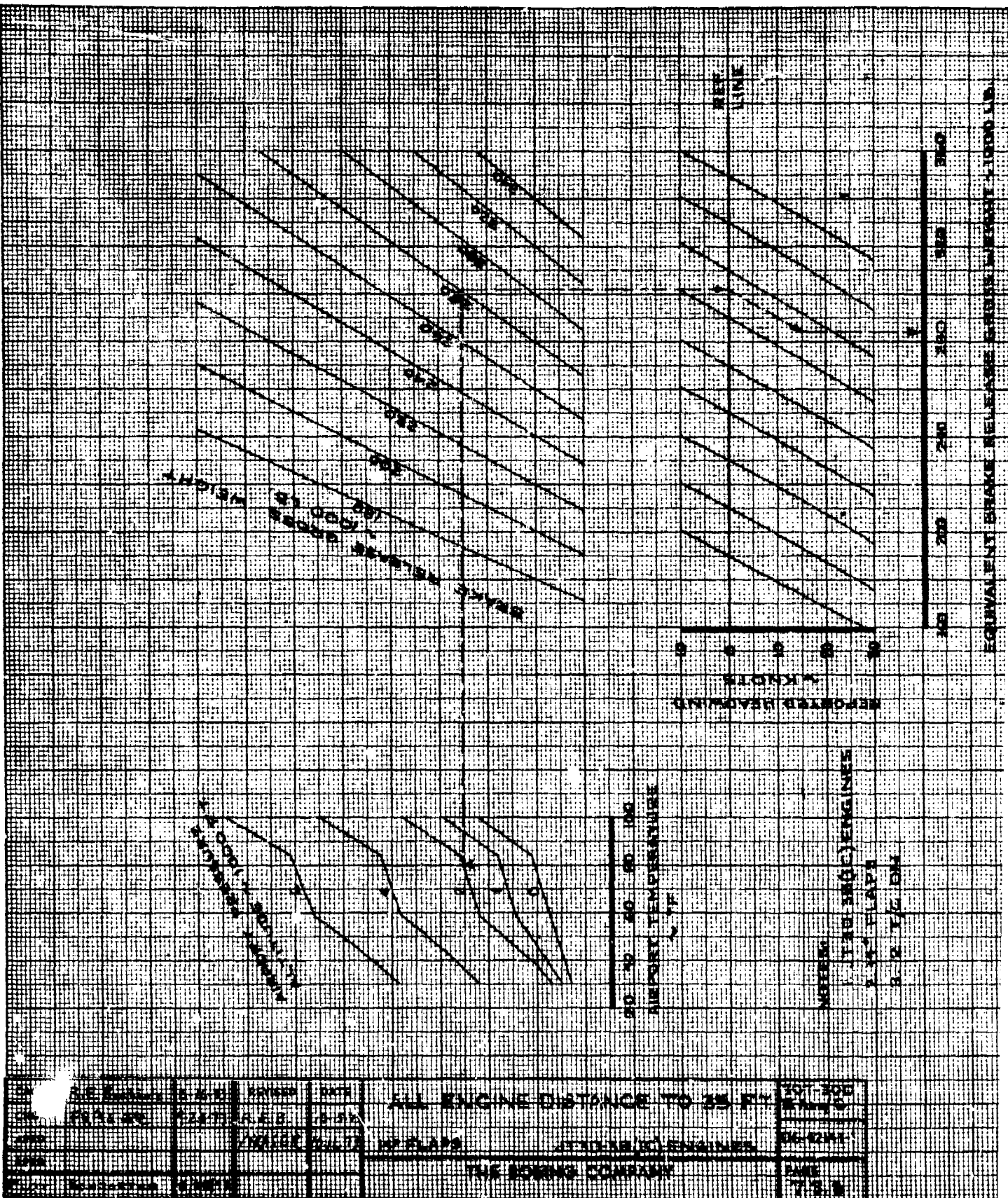
TOT-300
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D6-42M1-1

PAGE
7.3.4







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REMARKS

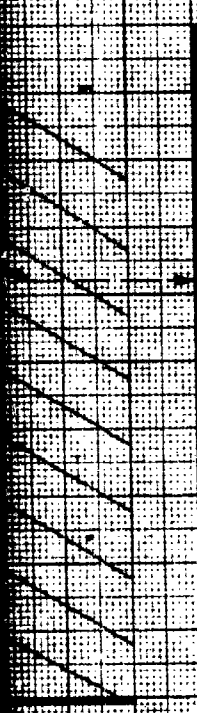
100 200 300 400 500 600 700 800 900 1000

EQUIVALENT BRAKE RELEASE PRESSURE 10000 LB

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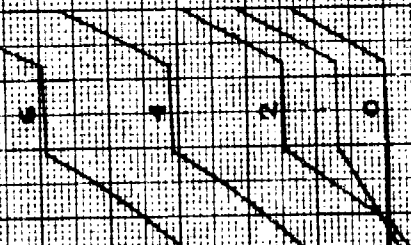
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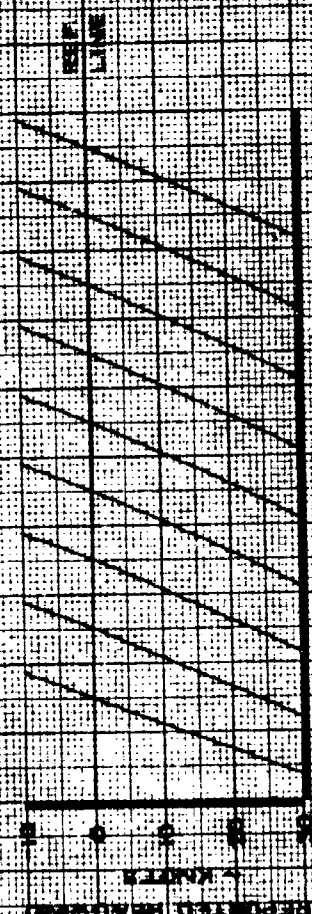
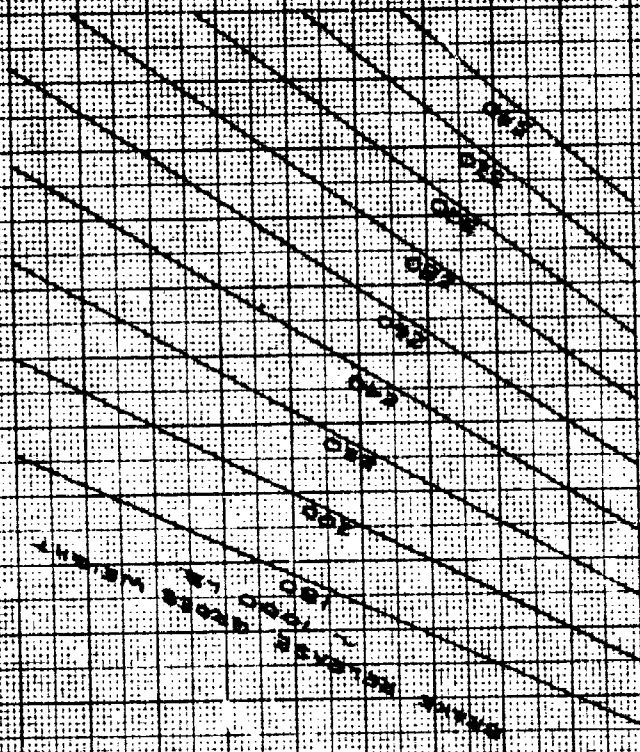
ONE	PILOT	5-10	POWER	DATE	ALL ENGINE CLIMBOUT PROFILE	107-500
ONE	ENGINEER	5-10	5-10	10-15-75	V _R 10 KTS	ENGINE
ONE					W FLAPS	107-500
ONE					107-500	107-500
ONE					THE BOEING COMPANY	107-500

CLIMBOUT PROFILE
AIRPORT ELEVATION 1000 FT
ALTITUDE 1000 FT



CLIMBOUT PROFILE
AIRPORT ELEVATION 1000 FT
ALTITUDE 1000 FT

NOTES:
1. 107-500 ENGINE
2. 107-500 ENGINE
3. 107-500 ENGINE
4. 107-500 ENGINE



CLIMBOUT PROFILE
AIRPORT ELEVATION 1000 FT
ALTITUDE 1000 FT

107-130	31 May 67	26-42-51	107-130
107-130	31 May 67	26-42-51	107-130

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上海大華印刷廠

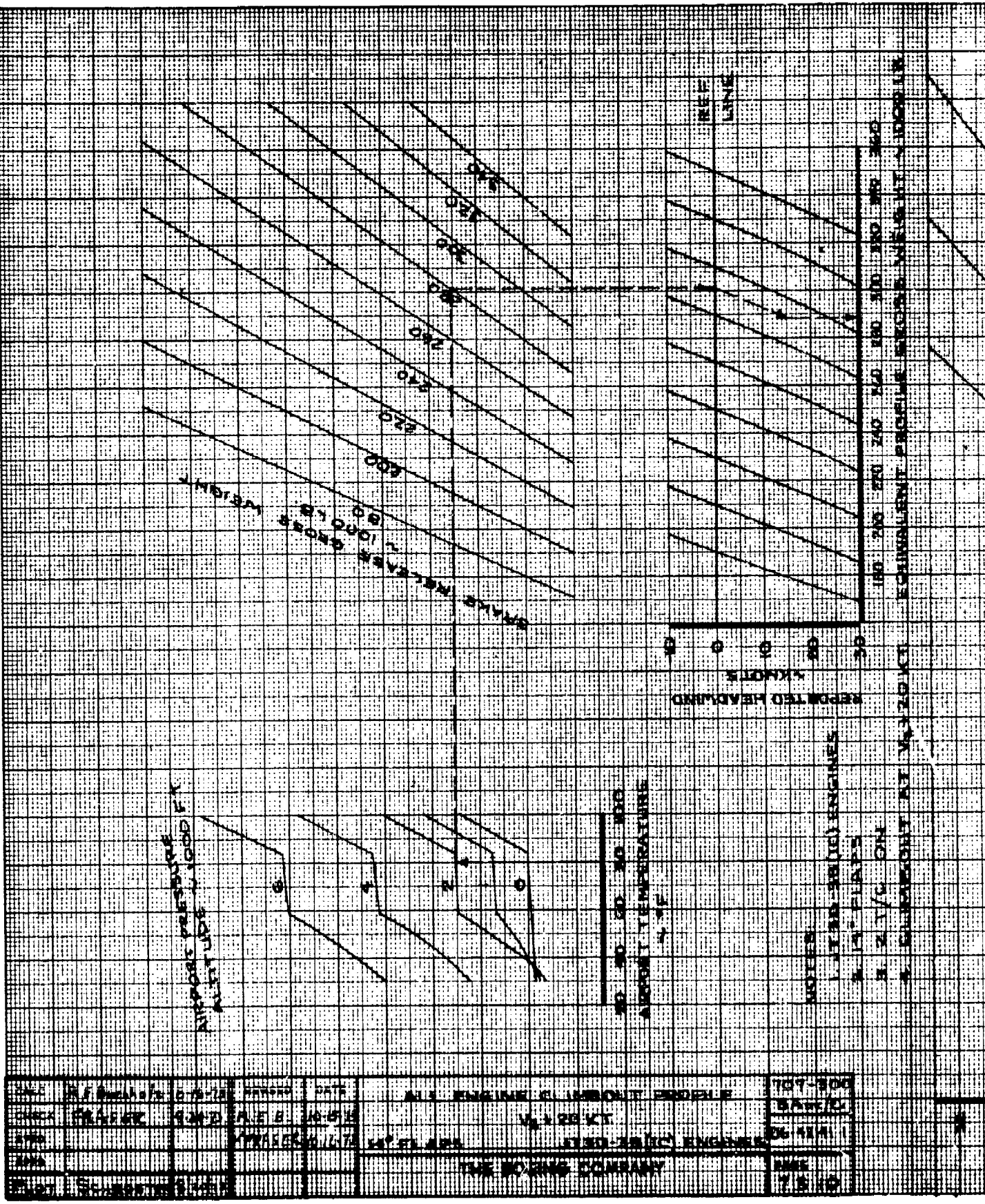
1000

眼藥水

A hand-drawn graph on millimeter paper showing the relationship between the logarithm of the number of individuals ($\log N$) and the logarithm of the number of species ($\log S$). The y-axis is labeled $\log N$ and the x-axis is labeled $\log S$. A series of points are plotted, showing a positive correlation. A straight line is drawn through the points, and a curve is also shown, representing a power-law relationship. The data points are labeled with numbers 1 through 10.

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陳子昂

姓名	性别	年龄	籍贯	职业	住址	电话	备注
王德胜	男	45	山东	教师	北京路123号	12345678	
李小红	女	32	江苏	医生	文化路456号	87654321	
张志强	男	28	河南	工程师	建设路789号	98765432	
刘小芳	女	25	四川	会计	商业路101号	11223344	
陈大明	男	50	广东	经理	金融路202号	22334455	
赵小华	女	38	湖北	护士	健康路303号	33445566	
孙伟	男	42	浙江	律师	法律路404号	44556677	
周丽娟	女	35	安徽	作家	文学路505号	55667788	
吴国强	男	48	江西	教授	学术路606号	66778899	
郑小梅	女	30	湖南	歌手	音乐路707号	77889900	
徐志远	男	55	福建	退休	公园路808号	88990011	
黄小燕	女	22	广西	学生	学校路909号	99001122	
林大伟	男	40	海南	公务员	政府路010号	00112233	
苏小玲	女	33	重庆	记者	新闻路111号	11223344	
周志强	男	47	山西	农民	农村路222号	22334455	
吴小芳	女	27	陕西	教师	教育路333号	33445566	
陈大明	男	52	甘肃	医生	医疗路444号	44556677	
赵小华	女	37	宁夏	工程师	技术路555号	55667788	
孙伟	男	43	青海	经理	商业路666号	66778899	
周丽娟	女	34	内蒙古	护士	健康路777号	77889900	
吴国强	男	49	新疆	律师	法律路888号	88990011	
郑小梅	女	29	西藏	作家	文学路999号	99001122	
徐志远	男	54	四川	教授	学术路000号	00112233	
黄小燕	女	23	云南	歌手	音乐路111号	11223344	
林大伟	男	41	贵州	公务员	政府路222号	22334455	
苏小玲	女	31	湖北	记者	新闻路333号	33445566	
周志强	男	46	湖南	农民	农村路444号	44556677	
吴小芳	女	26	江西	教师	教育路555号	55667788	
陈大明	男	51	安徽	医生	医疗路666号	66778899	
赵小华	女	36	浙江	工程师	技术路777号	77889900	
孙伟	男	44	江苏	经理	商业路888号	88990011	
周丽娟	女	35	山东	护士	健康路999号	99001122	
吴国强	男	50	河南	律师	法律路000号	00112233	
郑小梅	女	30	广东	作家	文学路111号	11223344	
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林大伟	男	42	重庆	公务员	政府路444号	44556677	
苏小玲	女	32	四川	记者	新闻路555号	55667788	
周志强	男	47	云南	农民	农村路666号	66778899	
吴小芳	女	27	贵州	教师	教育路777号	77889900	
陈大明	男	52	湖北	医生	医疗路888号	88990011	
赵小华	女	37	湖南	工程师	技术路999号	99001122	
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吴小芳	女	26	重庆	教师	教育路999号	99001122	
陈大明	男	51	四川	医生	医疗路000号	00112233	
赵小							

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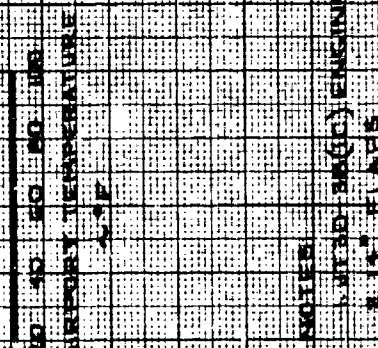
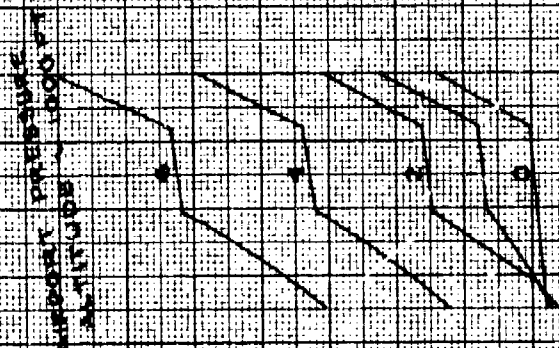
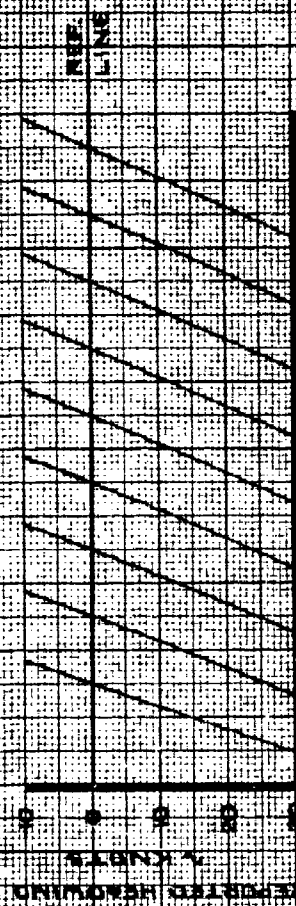
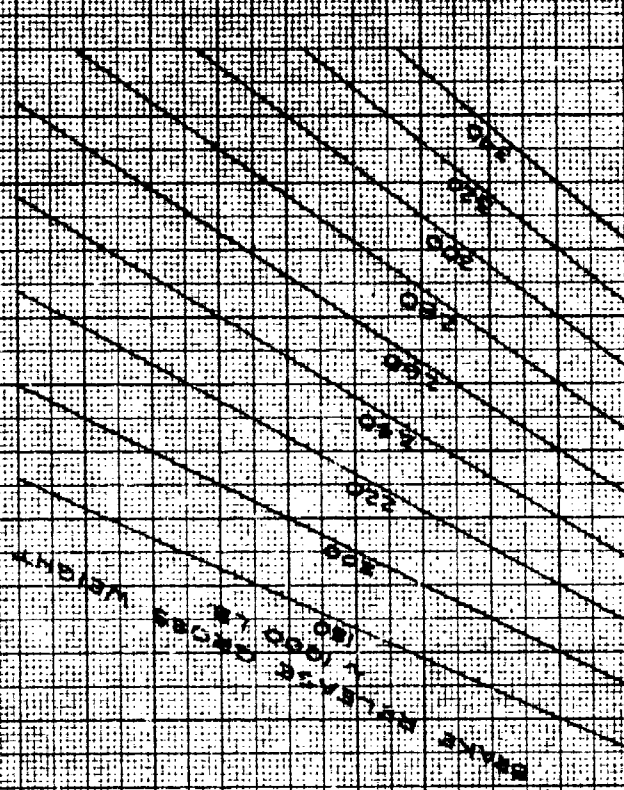
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WATER LEVEL TIME
3:00 PM

11-11-1964

THE

1. AIRCRAFT TYPE	2. ENGINE TYPE	3. ALTITUDE (FT)	4. ALL ENGINE CLIMBOUT PROFILE	5. TGT-500
6. FUEL TYPE	7. FUEL FLOW (GPH)	8. FUEL FLOW (GPH)	9. ALTITUDE (FT)	10. TGT-500
11. FUEL FLOW (GPH)	12. FUEL FLOW (GPH)	13. FUEL FLOW (GPH)	14. ALTITUDE (FT)	15. TGT-500
16. FUEL FLOW (GPH)	17. FUEL FLOW (GPH)	18. FUEL FLOW (GPH)	19. ALTITUDE (FT)	20. TGT-500
21. FUEL FLOW (GPH)	22. FUEL FLOW (GPH)	23. FUEL FLOW (GPH)	24. ALTITUDE (FT)	25. TGT-500
26. FUEL FLOW (GPH)	27. FUEL FLOW (GPH)	28. FUEL FLOW (GPH)	29. ALTITUDE (FT)	30. TGT-500
31. FUEL FLOW (GPH)	32. FUEL FLOW (GPH)	33. FUEL FLOW (GPH)	34. ALTITUDE (FT)	35. TGT-500
36. FUEL FLOW (GPH)	37. FUEL FLOW (GPH)	38. FUEL FLOW (GPH)	39. ALTITUDE (FT)	40. TGT-500
41. FUEL FLOW (GPH)	42. FUEL FLOW (GPH)	43. FUEL FLOW (GPH)	44. ALTITUDE (FT)	45. TGT-500
46. FUEL FLOW (GPH)	47. FUEL FLOW (GPH)	48. FUEL FLOW (GPH)	49. ALTITUDE (FT)	50. TGT-500
51. FUEL FLOW (GPH)	52. FUEL FLOW (GPH)	53. FUEL FLOW (GPH)	54. ALTITUDE (FT)	55. TGT-500
56. FUEL FLOW (GPH)	57. FUEL FLOW (GPH)	58. FUEL FLOW (GPH)	59. ALTITUDE (FT)	60. TGT-500
61. FUEL FLOW (GPH)	62. FUEL FLOW (GPH)	63. FUEL FLOW (GPH)	64. ALTITUDE (FT)	65. TGT-500
66. FUEL FLOW (GPH)	67. FUEL FLOW (GPH)	68. FUEL FLOW (GPH)	69. ALTITUDE (FT)	70. TGT-500
71. FUEL FLOW (GPH)	72. FUEL FLOW (GPH)	73. FUEL FLOW (GPH)	74. ALTITUDE (FT)	75. TGT-500
76. FUEL FLOW (GPH)	77. FUEL FLOW (GPH)	78. FUEL FLOW (GPH)	79. ALTITUDE (FT)	80. TGT-500
81. FUEL FLOW (GPH)	82. FUEL FLOW (GPH)	83. FUEL FLOW (GPH)	84. ALTITUDE (FT)	85. TGT-500
86. FUEL FLOW (GPH)	87. FUEL FLOW (GPH)	88. FUEL FLOW (GPH)	89. ALTITUDE (FT)	90. TGT-500
91. FUEL FLOW (GPH)	92. FUEL FLOW (GPH)	93. FUEL FLOW (GPH)	94. ALTITUDE (FT)	95. TGT-500
96. FUEL FLOW (GPH)	97. FUEL FLOW (GPH)	98. FUEL FLOW (GPH)	99. ALTITUDE (FT)	100. TGT-500



DT-300
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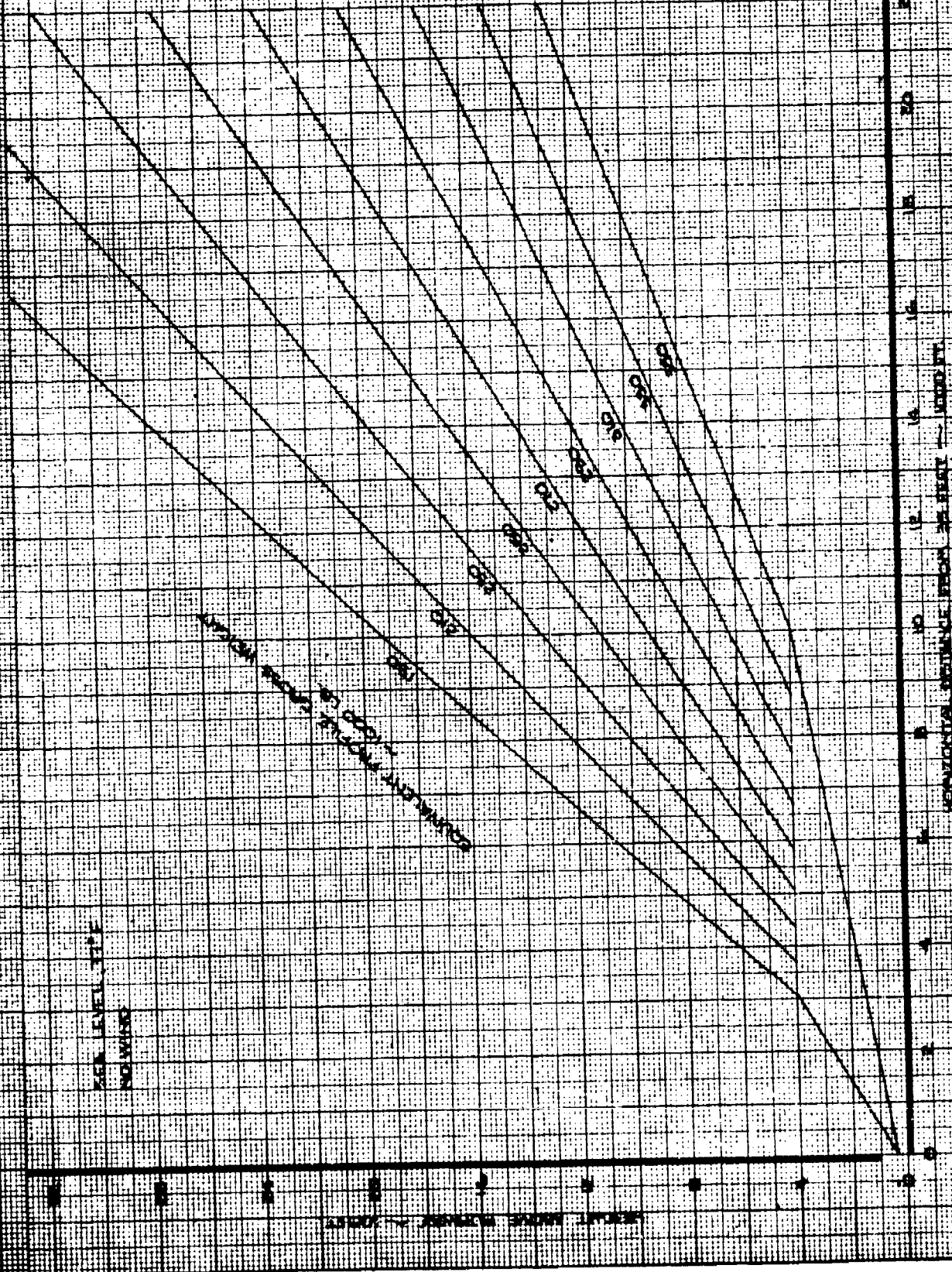
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2. 11" FLAPS

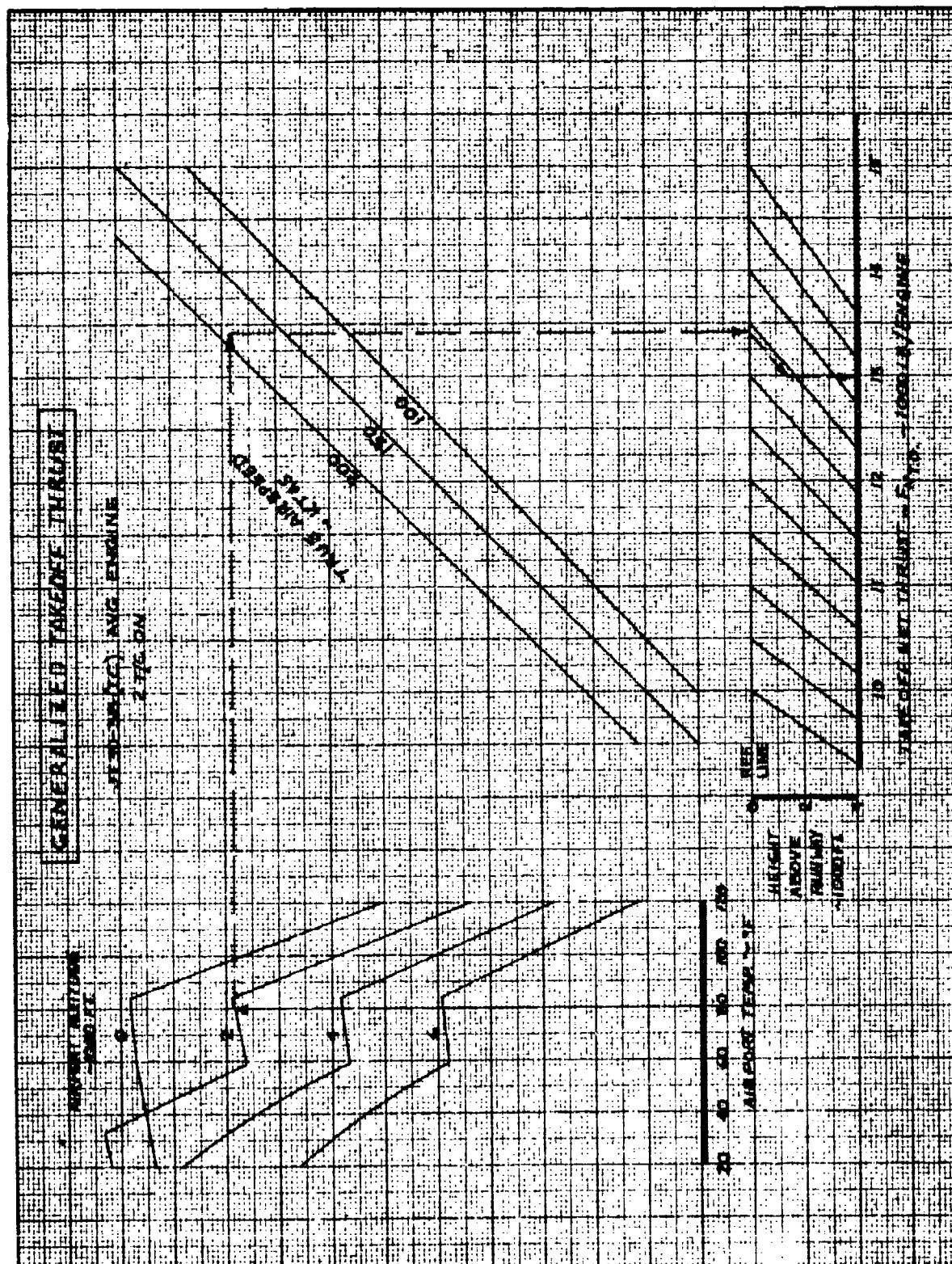
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4. CONSTANT AT 100000

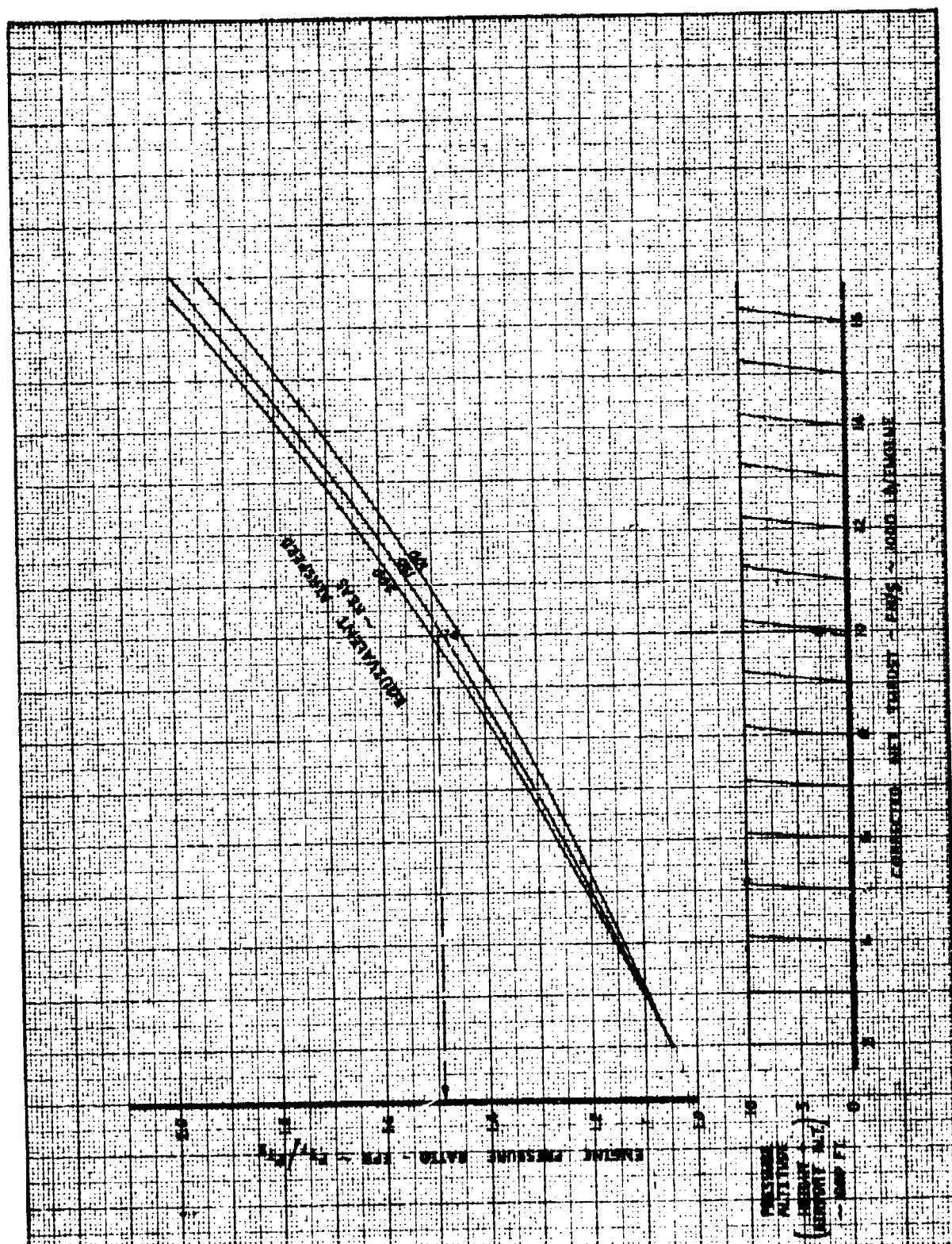
EQUIVALENT PROFILE WEIGHTS PERCENT 100000



HORIZONTAL DISTANCE FROM 25 FEET - 1000 FT



CALC	R. E. Buchholz	8-20-73	REVISED	DATE	GENERALIZED TAKEOFF THRUST	707-300
CHECK	FRASER	9-24-73	R. E. B.	10-18-73	JT30-3B(1C) AVG. ENGINES	BAV/C
APP			FRASER	10-17-73		DE-42141-1
APP						PAGE
INK	SCHROEDER				THE BOEING COMPANY	7.3.12



<div> <div>CALC</div> <div>R.E. BUCKLEY</div> <div>9-7-78</div> </div> <div> <div>CHECK</div> <div>FRASER</div> <div>9-29-73</div> </div> <div> <div>APR</div> <div></div> <div></div> </div> <div> <div>APR</div> <div></div> <div></div> </div> <div> <div>ENR</div> <div>W.B. BROOKS</div> <div>5/11/73</div> </div>	<div> <div>REVISED</div> <div></div> </div> <div> <div>DATE</div> <div></div> </div>	<div> <div>CONVERSION CHART</div> <div>CORRECTED NET THRUST</div> <div>TO ENGINE PRESSURE RATIO</div> <div>JT3D-38(IC) ENGINES</div> </div> <div> <div>THE BOEING COMPANY</div> </div>	<div> <div>701-300</div> <div>BA-1C</div> <div>DC-42141-1</div> </div> <div> <div>PAGE</div> <div>7-3 13</div> </div>
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